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United States Air Force
611th Civil Engineer Squadron

Elmendorf AFB, Alaska

Final

Remedial Investigation Report
Galena Airport and Campion Air Station

Volume 6—Appendix C - G

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APPENDIX C

Regulatory Discussion

Applicable or Relevant and Appropriate Requirements (ARARs)

1.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601 *et seq.,* establishing the Superfund program to address remediation of NPL sites. The regulations adopted by the U.S. Environmental Protection Agency (USEPA) that implement this program are found in 40 *Code of Federal Regulations* (CFR) Part 300, also known as the National Contingency Plan (NCP). CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 which mandated that the level or standard of control specified in a remedial action at NPL sites for the site-specific pollutants be "at least that of any applicable or relevant and appropriate (ARAR) standard, requirement, criteria, or limitation under any federal environmental law, or any more stringent standard, requirement, criteria, or limitation promulgated pursuant to a state environmental statute." SARA also established that the requirements of the NCP apply to federal facilities, including their implementation of the Installation Restoration Program (IRP) at each facility.

CERCLA, as amended by SARA, requires that federal facility remedial actions (for NPL as well as IRP sites) comply with requirements or standards under federal and state environmental laws. Therefore, ARARs are pertinent to Galena and Campion. The 1990 NCP incorporates the new statutory requirement that actions at any remedial sites at this facility must comply not only with ARARs under federal laws, but also with promulgated standards, requirements, criteria, or limitations under state environmental or facility siting laws that are more stringent than corresponding federal standards. "Promulgated" state requirements are those laws or regulations that are of general applicability and are legally enforceable. In terms of state ARARs, only those promulgated standards that are (1) identified by the state in a timely manner; and (2) more stringent than federal requirements may be ARARs.

The terms "applicable" and "relevant and appropriate" are defined as follows:

"**Applicable**" requirements, as defined at 40 CFR Section 300.4, are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Applicable requirements are those that would be legally applicable if the remedial action had not been taken under CERCLA; the concept requires that all jurisdictional prerequisites and criteria of the particular statute have been met.

"**Relevant and appropriate**" requirements, as defined in 40 CFR Section 300.4, are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that, while not applicable (as defined above), address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site.

The preliminary ARARs described herein were identified in accordance with *CERCLA Compliance with Other Laws Manual* (USEPA/540/G-89/006 and USEPA/540/G-89/009) and *Guidance for Conducting Remedial Investigations Under CERCLA, Interim Final* (USEPA/540/G-89/004). These ARARs will be reassessed in the future, and expanded or refined as needed. Ultimately, the preferred remedial action alternative will be assessed against the CERCLA cleanup criteria, including attainment of, or compliance with, ARARs. This preliminary ARAR identification is divided into three categories of ARARs: 1) ambient or "chemical-specific" requirements; 2) locational standards; and 3) performance, design, or other "action-specific" requirements.

1.1 To Be Considered

Criteria, advisories or guidance documents that do not meet the definition of ARARs but may assist in determining what is necessary to be protective or otherwise useful in developing Superfund remedies are described as information "to-be-considered" (TBC). Three general categories of TBC information are: (1) health effects information with a high degree of credibility, i.e., reference doses; (2) technical information on how to perform or evaluate site investigations or response actions; and (3) policy, i.e., USEPA's groundwater policy. The 1990 amendments to the NCP emphasize that TBC information is to be used on an "as appropriate" basis and is intended to complement the use of ARARs, not be in competition with ARARs.

2.0 CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are typically health-based or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the environment (soil, groundwater, surface water, or air) as a result of the remedial action. Potential federal and state chemical-specific ARARs for Galena Airport and Campion Air Force Station are summarized in the following subsections.

2.1 Federal Groundwater Protection Standards

Citations:

40 CFR Part 264

Discussion:

The Resource Conservation and Recovery Act (RCRA) sets forth the maximum concentrations for constituents for groundwater protection in 40 CFR Part 264, Subpart F. Table 2-1 lists these maximum concentrations which are relevant and appropriate.

Table 2-1

RCRA Subpart F Maximum Concentration of Constituents for Groundwater Protection

Constituent	Maximum Concentration (mg/L)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,9a-octahydro-1, 4-endo, endo-5,8-dimethano naphthalene	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenylethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_6$, Technical chlorinated camphene, 67-69 percent chlorine)	0.005
2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

2.2 Drinking Water Standards

Citations:

40 CFR Part 141
18 AAC Chapter 80

Discussion:

The National Primary Drinking Water Regulations establish Maximum Contaminant Levels (MCLs) which are enforceable standards under the Safe Drinking Water Act for specific contaminants in public water supplies. Drinking water standards are relevant and appropriate for establishing cleanup levels for groundwater even if it is not currently a drinking water source. Maximum Contaminant Level Goals (MCLGs) are non-enforceable goals on which MCLs are based. Groundwater restoration levels are based on MCLs and MCLGs.

Table 2-2 presents a side by side comparison of the published federal MCLs, State of Alaska MCLs, national and state secondary drinking water standards, and national MCLGs.

Table 2-2

National and Alaska State Drinking Water Standards

Contaminants	National Primary MCLs [a] (mg/L)	Alaska Primary MCLs [b] (mg/L)	National and State Secondary MCLs [c] (mg/L)	National MCLGs [d] (mg/L)
Organics [e]				
Benzene	0.005	0.005	--	zero
Benzo[a]pyrene		0.0002		
Carbon Tetrachloride		0.005		
Chloroform	0.1	--	--	--
o-Dichlorobenzene		0.6		
p-Dichlorobenzene		0.075		
Dichloromethane	0.005 [f]	0.005	--	zero
Di(2-ethylhexyl)adipate		0.4		
Di(2-ethylhexyl)phthalate	0.006 [f]	0.006	--	zero [f]
1,2-Dichloroethane	0.005	0.005	--	--
1,1-Dichloroethene		0.007		
cis-1,2-Dichloroethene	--	0.07	--	--
trans-1,2-Dichloroethene	--	0.1	--	--
1,2-Dichloropropane		0.005		
Ethylbenzene	0.7	0.7	--	0.7
Hexachlorobenzene		0.001		
Hexachlorocyclopentadiene		0.05		
Monochlorobenzene		0.1		
Polychlorinated Biphenyls		0.0005		
Styrene		0.1		
2,3,7,8-TCDD (Dioxin)		3×10^{-8}		
Tetrachloroethylene	0.005	0.005	--	zero
Toluene	1	1	--	1
1,2,4-Trichlorobenzene		0.07		
1,1,1-Trichloroethane	0.2	0.2	--	0.20
1,1,2-Trichloroethane	0.2 [f]	0.005	--	0.003 [f]
Trichloroethylene	0.005	0.005	--	zero
Vinyl Chloride		0.002		
Xylenes (total)	10	10	--	10
Inorganics				
Aluminum	--	--	0.2	--
Antimony	0.006 [f]	0.006	--	0.006 [f]
Arsenic	0.05 [h]	0.05	--	--
Barium	1 [h], 2 [e]	2	--	2 [e]
Beryllium	0.004 [f]	0.004	--	0.004 [f]

Table 2-2

(Continued)

Contaminants	National Primary MCLs [a] (mg/L)	Alaska Primary MCLs [b] (mg/L)	National and State Secondary MCLs [c] (mg/L)	National MCLGs [d] (mg/L)
Cadmium	0.005	0.005	--	0.005
Chloride	--	--	250	--
Chromium	0.1	0.1	--	0.1
Copper	1.3 [h]	--	1.0	1.3
Cyanide (as free Cyanide)	0.2 [f]	0.2	--	0.2 [f]
Fluoride	4.0	4.0	2.0	4.0
Iron	--	--	0.3	--
Lead	.015 [h]	0.05 [j]	--	zero
Manganese	--	--	0.05	--
Mercury	0.002	0.002	--	0.002
Nickel	0.1 [f]	0.1	--	0.1 [f]
Nitrate (as Nitrogen)	10	10	--	10
Nitrite (as Nitrogen)	1	1	--	1
Total Nitrate and Nitrite (as Nitrogen)	10	10	--	10
Selenium	0.05	0.05	--	0.05
Silver	0.05 [h]	--	0.1	--
Sodium			250	
Sulfate	--	--	250	--
TDS (total dissolved solids)	--	--	500	--
Thallium	0.002 [f]	0.002	--	0.0005 [f]
Zinc	--	--	5	--
Organic Pesticides				
		--	--	--

[a] From 40 CFR, Section 141.61 for organics and Section 141.62 for inorganics (effective 30 July 1992, unless otherwise noted).
[b] From 18 AAC 80.070, Alaska Register 118, July 1991.
[c] From 40 CFR Section 143.3 (effective 30 July 1992, unless otherwise noted).
[d] From 40 CFR Section 141.50 for organics and Section 141.51 for inorganics (effective 30 July 1992, unless otherwise noted).
[e] Effective 1 January 1993.
[f] Effective 17 January 1994.
[g] Effective 17 August 1992.
[h] From 40 CFR, Section 141.11 for inorganics and Section 141.12 for organics (effective 1 July 1991); however, the lead level is effective only until 7 December 1992). There is no longer an MCL for lead or copper (56 Federal Register 26460, June 7, 1991); however, there is an action level of 0.015 mg/L for lead and 1.3 mg/L for copper.
[i] Applies only to community water systems which serve a population of 10,000 or more that have a disinfectant added to the water.
[j] The Alaska Department of Environmental Conservation expects to amend its regulations in March 1993 to reflect the federal action level for lead of 0.015 mg/L and 1.3 mg/L for copper.
-- MCL or MCLG not specified.

2.3 Alaska and Federal Water Quality Standards

Citations:

40 CFR Part 131
18 AAC Chapter 70
18 AAC Chapter 80
USEPA Quality Criteria for Water, 1991

Discussion:

A water quality standard defines the water quality goals of a water body by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. The State of Alaska Water Quality Standards (found at 18 AAC Chapter 70) identify desired uses for water in the state (i.e., recreational, drinking water) and establish in-stream criteria for organic and inorganic constituents which are deemed necessary for the protection of the designated uses of that waterbody. Protected water classes applicable to the Yukon River include:

A) Water Supply
   i) drinking, culinary, and food processing;
   ii) agriculture, including irrigation and stock watering;
   iii) aquaculture, and
   iv) industrial;

B) Water Recreation
   i) contact recreation
   ii) secondary recreation

C) Growth and propagation of fish, shellfish and other aquatic life and wildlife.

The state's promulgated surface water quality standards are presented in Table 2-3 and are legally applicable. The State of Alaska Water Quality Standards apply to groundwater as well as surface water (see 18 AAC 70.110(46) and AS 46.03.900(35).

The USEPA has also developed ambient surface water quality criteria (SWQC) for the protection of aquatic life, which are found in *Quality Criteria for Water* (May 1991) and are legally applicable to cleanup activities. These federal SWQC establish acceptable in-stream concentrations of pollutants for the protection of aquatic life, as set forth in Table 2-4.

Table 2-3

Alaska Surface Water Quality Standards

Freshwater Uses	Dissolved Inorganic Substances
Water Supply (drinking, culinary, and food processing)	Total dissolved solids (TDS) from all sources shall not exceed 500 mg/L. Neither chlorides nor sulfates shall exceed 200 mg/L.
Water Supply (agriculture, including irrigation and stock watering)	TDS shall not exceed 1,000 mg/L, sodium absorption ratio less than 2.5, sodium percentage less than 60 percent, residual carbonate less than 1.25 mg/L, and boron less than 0.03 mg/L.
Water Recreation (contact recreation)	Not Applicable
Water Recreation (secondary recreation)	Not Applicable
Growth and Propagation of Fish, Shellfish other Aquatic Life and Wildlife	TDS shall not exceed a maximum of 1,500 mg/L, including natural conditions. Increase in TDS shall not exceed one-third of the concentration of the natural condition of the body of water.
Freshwater Uses	**Petroleum Hydrocarbons, Oil and Grease**
Water Supply (drinking, culinary, and food processing)	Shall not cause a visible sheen upon the surface of the water. Shall not exceed concentrations which individually or in combination impart odor or taste as determined by organoleptic test.
Water Supply (agriculture, including irrigation and stock watering)	Shall not cause a visible sheen upon the surface of the water.
Water Recreation (contact recreation)	Shall not cause a film, sheen, or discoloration on the surface or floor of the water body or adjoining shorelines. Surface waters shall be virtually free from floating oils.
Water Recreation (secondary recreation)	Shall not cause film, sheen, or discoloration on the surface or floor of the water body or adjoining shorelines. Surface waters shall be virtually free from floating oils.
Growth and Propagation of Fish, Shellfish other Aquatic Life and Wildlife	Total hydrocarbons in the water column shall not exceed 15 µg/L, or 0.01 times the lowest measured continuous flow 96 hour LC_{50} for life stages of species identified by the department as the most sensitive, biologically important species in a particular location, whichever concentration is less (see notes 8 and 9). Total aromatic hydrocarbons in the water column shall not exceed 10 µg/L, or 0.01 times the lowest measured continuous flow 96 hour LC_{50} for life stages is species identified by the department as the most sensitive, biologically important species in a particular location, whichever concentration is less (see notes 9 and 10). Concentrations of hydrocarbons, animal fats, or vegetable oils in the sediment shall not cause deleterious effects to aquatic life. Shall not cause a film, sheen, or discoloration on the surface or floor of the water body or adjoining shorelines. Surface waters shall be virtually free from floating oils.

Table 2-3

(Continued)

Freshwater Uses	Toxic and Other Deleterious Organic and Inorganic Substances
Water Supply (drinking, culinary, and food processing)	Substances shall not exceed Alaska Drinking Water Standards (18 AAC Ch. 80) or USEPA Quality Criteria for Water as applicable to substance.
Water Supply (agriculture, including irrigation and stock watering)	Same as where contact with a product destined for subsequent human consumption is present. Same as Growth and Propagation of Fish, Shellfish Other Aquatic Life and Wildlife or Federal Water Pollution Control Administration, Water Quality Criteria (WQC/FWPCA) as applicable to substances for stock-waters; concentrations for irrigation waters shall not exceed WQC/FWPCA or WQC 1972.
Water Recreation (contact recreation)	Substances shall not exceed Alaska Drinking Water Standards (18 AAC Ch. 80) or USEPA Quality Criteria for Water as applicable to substance.
Water Recreation (secondary recreation)	Substances shall not be present which pose hazards to incidental human contact.
Growth and Propagation of Fish, Shellfish other Aquatic Life and Wildlife	Substances shall not individually or in combination exceed 0.01 times the lowest measured 96 hour LC_{50} for life stages of species identified by the department as being the most sensitive, biologically important to the location, or exceed criteria cited in USEPA Quality Criteria for Water or Alaska Drinking Water Standards (18 AAC Ch. 80), whichever concentration is less. Substances shall not be present at or exceed concentrations which individually or in combination impart undesirable odor or taste to fish or other aquatic organisms as determined by either bioassay or organoleptic tests.

Source: 18 AAC Chapter 70

Table 2-4

Federal Surface Water Quality Criteria

Chemical	Freshwater SWQC	
	Acute (μg/L)	Chronic (μg/L)
METALS		
Aluminum	ND	ND
Antimony	88	30
Arsenic	360 [c]	190 [c]
Barium	ND	ND
Beryllium	130 [a]	5.3 [a]
Cadmium	3.9+	1.1+
Calcium	ND	ND
Chromium (total)	1,700+ [b]	210+ [b]
Cobalt	ND	ND
Copper	9.2+	6.5+
Iron	ND	ND
Lead	82+	3.2+
Magnesium	ND	ND
Manganese	ND	ND
Mercury	2.4	0.012
Molybdenum	ND	ND
Nickel	1,400+	160+ [b]
Potassium	ND	ND
Selenium	20	5
Silver	0.92	0.12 [a]
Sodium	ND	ND
Tin	--	--
Thallium	1,400 [a,b]	40 [a,b]
Vanadium	ND	ND
Zinc	120+	110+
ORGANOCHLORINE PESTICIDES		
alpha-BHC	100	ND
delta-BHC	100	ND
VOLATILE ORGANICS		
Acetone	ND	ND
Benzene	5300 [a]	ND

Table 2-4

(Continued)

Chemical	Freshwater SWQC	
	Acute ($\mu g/L$)	Chronic ($\mu g/L$)
VOLATILE ORGANICS (continued)		
Bromodichloromethane	11000 [a]	ND
Carbon disulfide	ND	2
Carbon tetrachloride	35,200 [a]	ND
Chlorobenzene	250 [a]	50 [a]
Chloroform	28900 [a]	1240 [a]
1,2-Dichloroethane	118000 [a]	20000 [a]
1,1-Dichloroethane	ND	ND
1,2-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	11600 [a]	ND
Ethyl benzene	32000 [a]	ND
4-Methyl-2-pentanone	ND	ND
Methylene chloride	11000 [a]	ND
1,1,1,2-Tetrachloroethane	9.32e+03	ND
1,1,2,2-Tetrachloroethane	9.32e+03	2400 [a]
Tetrachloroethene	ND	ND
Toluene	17500 [a]	ND
1,1,1-Trichloroethane	18000 [a]	ND
1,1,2-Trichloroethane	18000 [a]	9400 [a]
Trichloroethene	45000 [a]	21900 [a]
Trichlorofluoromethane	11000 [a]	ND
Xylenes (total)	ND	ND
SEMIVOLATILE ORGANICS		
Acenaphthene	[d]	[d]
Aniline	[e]	[e]
Anthracene	ND	ND
Benzo(a)anthracene	ND	ND
Benzo(a)pyrene	ND	ND
Benzo(b)fluoranthene	ND	ND
Benzo(k)fluoranthene	ND	ND
Butylbenzylphthalate	940 [a]	3 [a]
Chrysene	ND	ND

Table 2-4

(Continued)

Chemical	Freshwater SWQC	
	Acute ($\mu g/L$)	Chronic ($\mu g/L$)
SEMIVOLATILE ORGANICS (continued)		
Di-n-butylphthalate	940[a]	3[a]
Dibenz(a,h)anthracene	ND	ND
Dibezofuran	ND	ND
2,4-Dimethylphenol	[e]	[e]
bis(2-ethylhexyl)phthalate	400	360
Fluoranthene	3980	ND
2-Hexanone	ND	ND
2-Methylnaphthalene	--	--
2-Methylphenol	--	--
Naphthalene	2300	620
Phenathrene	30	6.3
Phenol	10200 [a]	2560 [a]
Pyrene	ND	ND
GENERAL		
Cyanide	22	5.2
Total Organic Carbon	--	--

Source: USEPA Quality Criteria for Water, May 1991, unless otherwise noted.

Notes:

[a] Lowest effect concentration, criteria not available.

[b] U.S. Environmental Protection Agency (EPA), 1991c. "Amendments to The Water Quality Standards Regulation to Establish the Numeric Criteria for Priority Toxic Pollutants Necessary to Bring All States into Compliance with Section 303(c)(2)(B); Proposed Rule. Federal Register 56223, Tuesday, November 19, 1991.

[c] Proposed criteria.

[d] (Total NH_3) pH and temperature dependant.

[e]Draft Water Quality Criteria for these parameters to be proposed March 25, 1994.

HBL Health-Based Level

ND No data available.

U Under review.

-- Not available.

+ Hardness dependent criteria (100 mg/l used).

2.4 <u>USEPA RCRA Proposed Corrective Action Media Action Levels</u>

Citations:

40 CFR Part 264, Subpart S, Section 264.521
(proposed July 27, 1990, 55 Federal Register 30798 *et seq.*)

Discussion:

The proposed RCRA corrective action Subpart S regulations contain methodology and criteria for calculating action levels for contaminants in soil, water, and air. Action levels are not cleanup standards; rather, an exceedence of a media action level potentially triggers the need for a corrective measures study (CMS) of a solid waste management unit (SWMU). RCRA Subpart S action levels are presented in Attachment A for all constituents for which Subpart S action levels have been calculated as of April 1994. The USEPA has estimated health-based risk assessment reference doses (RfDs) and carcinogenic slope factors (CSFs) used in the calculation of the action levels. The most recent updates of these factors can be obtained from "The Electronic Handbook of Risk Assessment Values" (Electronic Handbook Publishers, Bellvue, WA, January 6, 1994).

Standard EPA action levels are calculated using methodologies outlined in the preamble to the proposed Subpart S rule, 55 Federal Register 30798-30873. The proposed Subpart S rule provides recommended exposure assumptions and governing equations for calculating action levels.

EPA Region III has developed its own methodology for calculation of "Risk Based Concentrations" RBCs which are used to assess cleanup needs (see Attachment B). The methodology for calculation of RBCs is analogous to that used for EPA's action levels, except that the effects of ingestion and inhalation of toxics are summed to calculate RBCs for water. Table 2-5 provides a complete list of those compounds for which RBCs can be calculated using

the data available in the most current *Electronic Handbook of Risk Assessment Values* and the USEPA Region III methodology.

Action levels calculated using the methodology proposed in Subpart S are to be considered as points of departure for setting cleanup standards. RCRA corrective action cleanup standards (media protection standards) (discussed in Section 2.5) are established at the CMS stage and may be less stringent than the action levels depending on the site conditions.

Since the RCRA Subpart S rules have not been promulgated, the media action levels are "to be considered" (TBC) information only.

2.5 USEPA RCRA Proposed Corrective Action Media Protection (Cleanup) Standards

Citations:

40 CFR Part 264, Subpart S, Section 264.525(d)
(proposed July 27, 1990, 55 Federal Register 30798 *et seq.*)

Discussion:

Media cleanup standards are contaminant concentrations that must be achieved by the remedial action under the RCRA corrective action program. Media cleanup standards must (1) ensure protection of human health and the environment; (2) be set for each medium of concern during the remedy selection process; and (3) be met at the "point of compliance" specified in Section 264.525(e) of Subpart S. The USEPA is proposing to set media cleanup standards within the overall context of the remedy selection process. Media cleanup standards, since they are also still in proposal stage, are TBC information.

2.6 Alaska Oil and Hazardous Substances Pollution Control Regulations

Citations:

46 Alaska Statutes Chapter 4, Chapter 9
AS 46.09
18 AAC Chapter 75

Discussion:

The Alaska Oil Pollution Control Law governs the discharge of oil and any necessary cleanup requirements. Pursuant to this law, the Alaska Oil and Hazardous Substances Control Regulations set forth the criteria and standards for discharges of oil and hazardous substances. These regulations include discharge reporting, cleanup, and disposal requirements as well as a schedule of civil penalties for violations. The Akzo Coatings (949 F.2d 1442) court decision clarified that "general requirements containing no specific numerical standards...can be enforceable ARARs". The *Alaska Oil and Hazardous Substance Pollution Control* regulations are legally applicable to cleanup activities.

2.7 Underground Storage Tank Regulations

Citations:

40 CFR Part 280
18 AAC Chapter 78

Discussion:

The Alaska Underground Storage Tank Regulations are promulgated standards for owners and operators of RCRA-regulated underground storage tanks (USTs). Soil cleanup goals associated with corrective action at regulated UST sites are addressed in 18 AAC

78.315. Cleanup goals will be determined by using Table 2-5, the "Guidance for Using Alaska Cleanup Matrix", which is copied from the "Guidance Manual for Underground Storage Tank Regulations 18 AAC 78" (June 18, 1991). The instructions for applying the matrix score sheet are also included in this guidance manual. These standards are enforcable ARARs that depend on site conditions, and are applicable to cleanup activities. There are no cleanup levels in the federal UST regulations.

2.8 Alaska Solid Waste Management Regulations

Citations:

18 AAC Chapter 60

Discussion:

The Alaska Solid Waste Management Regulations set forth standards for solid waste disposal facilities, including accumulation and storage limitations, landspreading restrictions, and requirements for special waste disposal. Permitting standards as well as monitoring and reporting requirements are set forth in these regulations. Additional state regulations for solid waste disposal facilities are currently being drafted by DEC, and will be sent out for proposal in late 1994. These standards are relevant and appropriate to remediation activities.

Table 2-5

Guidance for Using Alaska Cleanup Matrix (UST and Non-UST Soil)

I. Matrix Score Sheet		
1. Depth to Subsurface Water		
< 5 feet	(10)	
5 - 15 feet	(8)	
15 - 25 feet	(6)	
25 - 50 feet	(4)	
> 50 feet	(1)	
2. Mean Annual Precipitation		
> 40 inches	(10)	
25 - 40 inches	(5)	
15 - 25 inches	(3)	
< 15 inches	(1)	
3. Soil Type (Unified Soil Classification)		
Clean, coarse-grained soils	(10)	
Coarse-grained soils with fines	(8)	
Fine-grained soils (low OC)	(3)	
Fine-grained soils (high OC)	(1)	
4. Potential Receptors		
Public Well within 1000 feet, or Private Well(s) within 500 feet	(15)	
Municipal/private well within 1/2 mile	(12)	
Municipal/private well within 1 mile	(8)	
No known well within 1/2 mile	(6)	
No known well witnin 1 mile	(4)	
Non-potable groundwater	(1)	
5. Volume of Contaminated Soil		
> 500 cubic yards	(10)	
100 - 500 cubic yards	(8)	
25 - 100 cubic yards	(5)	
>De Minimis - 25 cubic yards	(2)	
De Minimis	(0)	

Matrix Score		Cleanup Level in mg/kg			
		Diesel	Gasoline/Unknown		
		diesel range pet. hydro.	gasoline range pet. hydro.	Benzene	BTEX
Level A	>40	100	50	0.1	10
Level B	27-40	200	100	0.5	15
Level C	21-26	1000	500	0.5	50
Level D	<20	2000	1000	0.5	100

2.9 Alaska and Federal Hazardous Waste Management Regulations

Citations:

18 AAC Chapter 62
40 CFR Part 261
40 CFR Part 268

Discussion:

The Alaska Hazardous Waste Management Regulations include the federal RCRA Subtitle C requirements with additional criteria and standards promulgated by the State of Alaska. The state adds requirements regarding: 1) the identification of hazardous waste; 2) reporting requirements for generators and transporters; 3) standards for owners and operators of treatment, storage, disposal facilities; and 4) requirements for hazardous waste delisting petitions. The Federal regulations in 40 CFR Part 261 address the requirements for identification of hazardous wastes, which is critical during any remediation activity that may result in generation of hazardous wastes. Also critical in remediation activities are the land disposal restrictions (a.k.a. "Land Ban"), 40 CFR Part 268, which require treatment standards for certain wastes generated during remedial actions. Both the state and federal rules are legally applicable to cleanup activities at this facility.

2.10 Alaska Guidance on Surface and Groundwater Cleanup Levels

Citation:

Alaska Department of Environmental Conservation Guidance

Discussion:

The State of Alaska has issued a number of guidance documents and memoranda which provide cleanup levels for various media. Since these guidance documents are not promulgated, they are not ARARs. However, they are TBC information sources. These guidance documents include:

- Alaska Interim Guidance for Surface and Groundwater Cleanup Levels (26 September 1990)--used in the oil and hazardous substance spill program;
- Alaska Guidance Manual for Underground Storage Tank Regulations (18 June 1991);
- Alaska Guidance for Non-UST Soil Cleanup (17 July 1991); and
- Storage, Remediation, and Disposal of Non-UST Petroleum Contaminated Soils (29 July 1991).

Table 2-5, the "Guidance for Using Alaska Cleanup Matrix" is copied from the "Alaska Guidance for Non-UST Soil Cleanup", which also includes instructions for applying the matrix score sheet are included in this guidance document.

2.11 Air Standards

The following air pollution regulations are ARARs, which are relevant and appropriate to cleanup activities:

- AS 46.03 - Water, Air, Energy, and Environmental Conservation;
- 18 AAC 50 - Alaska Air Quality Control Regulations;
- 18 AAC 52 - Alaska Motor Vehicle Emissions Inspection Rules;
- 40 CFR Part 50 - National Primary and Secondary Ambient Air Quality Standards;

- 40 CFR Part 50 - National Primary and Secondary Ambient Air Quality Standards;
- 40 CFR Part 58 - Ambient Air Quality Surveillance;
- 40 Part 60 - Standards of Performance for New Stationary Sources; and
- 40 CFR Part 61 - National Emissions Standards for Hazardous Air Pollutants.

2.12 Toxic Substances Control Act (TSCA)

Citations:

40 CFR Part 761
18 AAC 60

Discussion:

Because PCBs are a constituent of concern, the TSCA regulations are applicable to the management of any confirmed PCB wastes. Wastes containing greater than or equal to 50 ppm PCBs are subject to the TSCA rules at 40 CFR Part 761.

Section 761.65 of these rules allows PCB wastes to be stored on site for up to one year from the date the waste is firsst placed in storage as long as the TSCA storage facility criteria are met. On-site storage may last for up to 30 days without triggering the TSCA storage facility requirements.

TSCA-regulated PCBs can be disposed of only at TSCA-authorized landfills or incinerated (40 CFR Part 761, Subpart D). Wastes that contain PCBs below 50 ppm are regulated under the Alaska solid waste rules (18 AAC 60).

PCB Spill Cleanup

The US EPA has developed national PCB spill cleanup criteria (40 CFR 761, Subpart G) which establish cleanup requirements linked to the risks posed by the spill and depend on the location and quantity of the spill. Generally, TSCA regulations are only applicable to items containing more than 50 ppm PCBs. Therefore, the US EPA spill cleanup criteria also apply only where the source of the spilled material is greater than 50 ppm PCBs. State of Alaska regulations under 18 AAC 75 provide the state with broad authority to oversee cleanup activities involving PCBs, including sites containing less than 50 ppm PCBs.

The US EPA Spill Policy also applies only to releases occurring after May 4, 1987. Cleanup requirements for releases prior to this date are established on an individual site basis by regional EPA offices and state regulatory authorities.

In general, the US EPA Spill Policy requires that media contaminated by a PCB spill be cleaned up to the same criteria as that established for the source of the spill. This requirement is dependent on the concentration of PCBs associated with the source of the spill, instead of the concentration associated with the contaminated media. For example, if a transformer having a PCB concentration of 600 ppm leaks, it will result in contaminated soil having PCB concentrations ranging from less than 600 ppm down to attenuating levels around 1 ppm. The Spill Policy states that all of the contaminated soil (even that at 1 ppm) requires management as though it contained the same concentration as the source (600 ppm).

In addition to defining management requirements for contaminated media, the Spill Policy also established several high-risk spill scenarios or other scenarios which trigger immediate reporting requirements and may, ultimately, dictate more stringent management requirements.

High-Risk Spill Scenarios

The cleanup of five high risk spill scenarios is addressed on a site-specific basis, though they are still subject to some of the general requirements. These five high-risk spill scenarios are spills to:

- Surface waters;
- Sewers or sewage treatment systems;
- Drinking water sources or distribution systems;
- Animal grazing lands; and
- Vegetable gardens.

In any of these situations, the National Response Center and the EPA Regional Office must be notified if the spill is greater than 10 pounds of PCBs. Also, the spill residue must be disposed of and the spill boundaries must be determined. For the first three cases, the EPA cleanup guidance must be obtained within 24 hours to determine the numerical cleanup level. State of Alaska notification and reporting requirements also apply.

Other Scenarios

For other scenarios, numerical standards have been set which depend on the location, quantity, and concentration of the spill. Initially, the spill residue should be disposed of and the spill boundary must be determined. If the spill involves more than 10 pounds of PCBs, the National Response Center and the EPA regional office must be contacted. Spills of less than one pound of PCBs and less than 500 ppm must be double washed and rinsed. All contaminated soil must be excavated and backfilled with clean soil.

Spills above 500 ppm in concentration or weighing more than one pound have immediate cleanup requirements. The area must be blocked off and areas of visible contamination should be documented then cleaned. Action should be taken within 24 hours (48 hours for PCB transformers) and the site must be sampled after cleanup. If the area is an electrical substation, solid surfaces must be cleaned to 100 $\mu g/100\ cm^2$, and the soil must be cleaned to 25 ppm (or 50 ppm and the area labeled).

If the spill occurs in an unrestricted area, replaceable household items should be disposed of according to 40 CFR § 761.60. All outdoor and indoor surfaces should be cleaned to 10 $\mu g/100\ cm^2$ and the ground excavated more than 10 inches and to less than 10 ppm.

2.13 Other Chemical-Specific ARARs

The following chemical-specific ARARs may potentially be applicable:

- AS 18.45 (Atomic Energy);
- AS 46.03.250--AS 46.03.317 (Radiation and Hazardous Waste Protection);
- 18 AAC 85 (Radiation Protection); and
- AS 46.03.320--AS 46.03.330 (Pesticide Control)
  18 ACC 90.

3.0 LOCATION-SPECIFIC ARARs

Location-specific ARARs are requirements that affect the management of hazardous constituents, or the units in which they are managed, due to the location of the unit(s). They might be triggered, for example, if groundwater remediation were selected as a remedial action which required the construction of new surface wastewater treatment units. Examples of sensitive locations for such units include wetlands, floodplains, historic areas, and wildlife refuges. Potential federal and state location-specific ARARs are set forth in Table 3-1.

Table 3-1

Potential Location-Specific ARARs

Statutory, Regulatory Basis	Citation	Description
Resource Conservation and Recovery Act	40 CFR Sec. 264.18 18 AAC Sec. 60 18 AAC Sec. 63.040	Prohibits or restricts siting of solid and hazardous waste management units in certain sensitive areas (100-year floodplain, active seismic area, wetlands).
Migratory Bird Treaty Act of 1972	16 USC Sec. 703-712 50 CFR Parts 10, 20, 21	If migratory birds are present, provides protection of almost all species of native birds in the U.S. from unregulated activities. Unregulated activities can include poisoning at hazardous waste sites.
Fish and Wildlife Conservation Act of 1980	16 USC Sec. 2901 50 CFR Part 83	Requires the submittal of conservation plans outlining provisions to conserve non-game fish and wildlife. Approved conservation plans are enforced by state agencies.
Federal Land Policy and Management Act	13 USC Sec. 1700 et seq.	Establishes requirements concerning utilization of public lands, particularly rights-of-way regulation, land use planning and land acquisition and appropriation of waters on public lands.
Fish and Wildlife Improvement Act	16 USC Sec. 661-666c	Provides for development, protection, rearing, and stocking of all species of wildlife, wildlife resources, and their habitat.
Endangered Species Act	16 USC 1531 et seq. 50 CFR Part 200 50 CFR Part 402	Provides for protection and conservation of various species of fish, wildlife, and plants.
Clean Water Act, Section 404	33 USC 1251 et seq. Sec. 404 40 CFR Part 230	Prohibits discharge of dredged or fill material into wetlands without a permit.
Fish and Wildlife Improvement Act	33 CFR 320-330	Provides for management of fish and wildlife.
Archaeological and Historic Preservation Act	16 USC Sec. 469 40 CFR 6.301(c)	Establishes procedures for preservation of historical and archaeological resources when terrain is altered as a result of a federal or federally licensed construction activity.
National Historic Preservation Act	16 USC Sec. 470 40 CFR Sec. 6.301(b) 36 CFR Part 800	Provides for the protection of historic places.
Historic Sites, Buildings, and Antiquities Act	16 USC Sec. 461-467	Provides for the protection of natural landmarks.
Alaska Coastal Management Program Law	AS 46.40	Provides for the use, management, restoration, and enhancement of the overall quality of the coastal environment.
Alaska Coastal Management Regulations	6 AAC 80 and 85	Provides for the regulated use of coastal areas and their resources.

Table 3-1

(Continued)

Statutory, Regulatory Basis	Citation	Description
Coastal Zone Management Act	16 USC Sec. 1451	Provides for the use, management, restoration, and enhancement of the overall quality of the coastal environment.
Coastal Barrier Resources Act	16 USC 3501	Protects coastal barrier resources.
Alaska Statutes, Title 46	AS 46.03 18 AAC 15 18 AAC 70 18 AAC 72	Environmental Conservation
Alaska Statutes, Title 46	AS 46.04 18 AAC 75	Oil and Hazardous Substance Pollution Control
Alaska Statutes, Title 46	AS 46.09 18 AAC 75	Hazardous Substance Release Control
Alaska Statutes, Title 16	AS 16 5 AAC 95	Alaska Fish and Game Requirements
Alaska Statutes, Title 41	AS 41.35 11 AAC 16	Alaska Historic Preservation Requirements
Alaska Statutes, Title 27	AS 27.19 11 AAC 96 11 AAC 97	Reclamation laws governing mining (includes gravel extraction)
Alaska Statutes, Title 41	AS 41.15 AS 41.17 11 AAC 95	Forest Resources and Practices
Alaska Statutes, Title 41	AS 41.06 11 AAC 84	Geothermal Resources
Alaska Statutes, Title 38 and Title 41	AS 38 AS 41.21 AS 41.23 AAC, Title 11	Activities on state lands (including tidelands and submerged lands)

4.0 ACTION-SPECIFIC ARARs

Action-specific ARARs are technology-based or activity-based requirements that may be triggered by the particular remedial activities chosen. Action-specific ARARs do not in themselves determine the remedial alternative, rather they place restrictions on the manner in which a selected alternative may be achieved. Table 4-1 sets forth action-specific ARARs that may be applicable to the remediation activities.

Table 4-1

Potential Action-Specific ARARs

Standard, Requirement, Criteria, or Limitation	Federal Citation	Description	State Citation
Solid Waste Disposal Act	42 USC Sec. 6901-6987	Resource Conservation and Recovery	AS 46.03 Environmental Conservation
Standards for Underground Injection Requirements	40 CFR Part 147	Require compliance with state underground injection requirements.	AS 31 20 AAC 25
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257	Establishes criteria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment and thereby prohibit open dumps.	18 AAC 62 Alaska Hazardous Waste Regulations 18 AAC 60
Criteria for Municipal Solid Waste Disposal Facilities	40 CFR Part 258	Establishes minimum federal criteria for design, construction, operation, and permitting of municipal solid waste landfills.	18 AAC 60. Additional state regulations will be promulgated after October 1993.
Identification and Listing of Hazardous Waste	40 CFR Part 261	Defines those solid wastes which are subject to regulation as hazardous waste.	18 AAC 62 Alaska Hazardous Waste Regulations
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards for generators of hazardous waste	18 AAC 62 Alaska Hazardous Waste Regulations
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Establishes standards which apply to persons transporting hazardous waste within the U.S.	18 AAC 62 Alaska Hazardous Waste Regulations

Table 4-1

(Continued)

Standard, Requirement, Criteria, or Limitation	Federal Citation	Description	State Citation
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Part 264	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	18 AAC 63 18 AAC 62 Alaska Hazardous Waste Regulations AS 46.09 Hazardous Substance Release Control
Standards for Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 CFR Part 266	Establishes requirements which apply to recyclable materials used in a manner constituting disposal or hazardous waste burned for energy recovery.	18 AAC 62 Alaska Hazardous Waste Regulations
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 CFR Part 267	Establishes minimum national standards that define acceptable management of hazardous waste land disposal facilities.	18 AAC 62 Alaska Hazardous Waste Regulations
Land Disposal Restrictions Program	40 CFR Part 268	Sets treatment standards for hazardous wastes based on the levels achievable by current technology; sets two-year national variances from the statutory effective dates due to insufficient treatment capacity.	18 AAC 62 Alaska Hazardous Waste Regulations
Hazardous Waste Permit Program	40 CFR Part 270	Establishes provisions covering basic EPA permitting requirements.	AAC 62 Alaska Hazardous Waste Regulations
Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (USTs)	40 CFR Part 280	Provides regulations pertaining to underground storage tanks.	18 AAC 78 Alaska Underground Storage Tank Regulations

Table 4-1

(Continued)

Standard, Requirement, Criteria, or Limitation	Federal Citation	Description	State Citation
Clean Water Act	33 USC Sec. 1251-1376		
EPA- Administered Permit Programs: The National Pollutant Discharge Elimination System	40 CFR Part 122	Requirements for the discharge of pollutants from any point source into waters of the U.S.	18 AAC 70 Alaska Water Quality Standards
	40 CFR Part 136	Guidelines which establish test procedures for analysis of pollutants.	
	40 CFR Part 403	Sets standards for discharging to an off-site publicly-owned treatment works (POTW).	18 AAC 72 Alaska Wastewater Disposal Regulations
Criteria and Standards for the National Pollutant Discharge Elimination System	40 CFR Part 125	Provides discharge criteria, chemical standards, and permit forms for existing industrial operations.	
State of Alaska, Oil Pollution Control Law		Establishes requirements relating to oil, petroleum, and hazardous substance pollution prevention, control, and cleanup.	AS 46.04 18 AAC 75 18 AAC 75.319 18 AAC 75.327 18 AAC 75.337 Alaska Oil and Hazardous Substances Pollution Control Regulations
Occupational Safety and Health Act of 1970	29 USC Sec. 657 and 667		AS 18.60
Occupational Safety and Health Standards	29 CFR Part 1910	Sets standards for safety in the work environment.	8 AAC 61
Safety and Health Regulations for Construction	29 CFR Part 1926	Sets standards for safety in the construction work environment.	

Table 4-1

(Continued)

Standard, Requirement, Criteria, or Limitation	Federal Citation	Description	State Citation
State of Alaska, Fire Protection		Sets standards and requirements for safety and fire protection.	AS 18.70 13 AAC 50 and 18
Safety and Health Standards for Federal Service Contracts	29 CFR Part 1925	States that safety and health standards are applicable to work performed under Federal Service Contracts.	
Clean Air Act	**42 USC Sec 7401-7642**		
National Emissions Standards for Hazardous Air Pollutants	40 CFR Part 61	Establishes emissions standards for hazardous air pollutants that may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating illness.	18 AAC 50 Alaska Air Quality Control Regulations 18 AAC 51 Alaska Administrative Procedure and Permit Regulations
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare.	18 AAC 50 Alaska Air Quality Control Regulations 18 AAC 51 Alaska Administrative Procedure and Permit Regulations

Table 4-1

(Continued)

Standard, Requirement, Criteria, or Limitation	Federal Citation	Description	State Citation
Safe Drinking Water Act	40 USC Sec. 300G		
Underground Injection Control Program	40 CFR Part 144	Provides for protection of underground sources of drinking water.	
Underground Injection Control Program: Criteria and Standards	46 CFR Part 146	Provides technical requirements for UIC programs.	AS 31.05 20 AAC 25
Toxic Substances Control Act	15 USC Sec. 2601-2671		
Federal Insecticide, Fungicide, and Rodenticide Act	7 USC Sec. 136-136y		
State of Alaska, Pesticide Control		Establishes standards and requirements for pesticide control.	AS 46.03.320 through 46.03.330 18 AAC 90
State of Alaska, Appropriation of Water		Establishes requirements concerning appropriation of water.	AS 46.15 11 AAC 93

Attachment A

RCRA Subpart S Action Levels

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
acenaphthene	83-32-9	0.06		NA			4800	--	--	--	2.1	--			
acenaphthylene	208-96-8			D			--	--	--	--	--	--			
acephate	30560-19-1	0.004		C	0.0087		320	804.598	--	--	0.14	0.04023			
acetaldehyde	75-07-0		0.009	B2		2.2E-06	--	--	9	0.4545	--	--			
acetate, ethyl	141-78-6	0.9		NA			72000	--	--	--	31.5	--			
acetic acid, 2,4,5-trichlorophenoxy	93-76-5	0.01		NA			800	--	--	--	0.35	--			
acetochlor	34256-82-1	0.02		NA			1600	--	--	--	0.7	--			
acetone	67-64-1	0.1		D			8000	--	--	--	3.5	--			
acetone cyanohydrin	75-86-5	0.07	0.01	NA			5600	--	10	--	2.45	--			
acetonitrile	75-05-8	0.006	0.05	NA			480	--	50	--	0.21	--			
acetophenone	98-86-2	0.1		D			8000	--	--	--	3.5	--			
acetyl chloride	75-36-5			D			--	--	--	--	--	--			
acifluorfen, sodium	62476-59-9	0.013		NA			1040	--	--	--	0.455	--			
acrolein	107-02-8	0.02	2E-05	C			1600	--	0.02	--	0.7	--			
acrylamide	79-06-1	0.0002		B2	4.5	0.0013	16	0.15556	--	0.0008	0.007	7.8E-06			
acrylate, 2-ethoxyethyl	106-74-1			NA			--	--	--	--	--	--			
acrylate, ethyl	140-88-5			B2	0.048		--	14.5833	--	--	--	0.00073			
acrylic acid	79-10-7	0.5	0.001	NA			40000	--	1	--	17.5	--			
acrylonitrile	107-13-1		0.002	B1	0.54	0.000068	--	1.2963	2	0.0147	--	6.5E-05			
adiponitrile	111-69-3			D			--	--	--	--	--	--			
alachlor	15972-60-8	0.01		B2	0.08		800	8.75	--	--	0.35	0.00044	0.002		
alar	1596-84-5	0.15		NA			12000	--	--	--	5.25	--			
aldicarb	116-06-3	0.0002		D			16	--	--	--	0.007	--	0.003		
aldicarb sulfone	1646-88-4	0.001		NA			80	--	--	--	0.035	--	0.003		
aldrin	309-00-2	3E-05		B2	17	0.0049	2.4	0.04118	--	0.0002	0.00105	2.1E-06		3	
allidochlor	93-71-0			NA			--	--	--	--	--	--			
ally	74223-64-6	0.25		NA			20000	--	--	--	8.75	--			
allyl alcohol	107-18-6	0.005		NA			400	--	--	--	0.175	--			
allyl chloride	107-05-1		0.001	C			--	--	1	--	--	--			
aluminum	7429-90-5			NA			--	--	--	--	--	--			
aluminum phosphide	20859-73-8	0.0004		NA			32	--	--	--	0.014	--			
amdro	67485-29-4	0.0003		NA			24	--	--	--	0.0105	--			
ametryn	834-12-8	0.009		NA			720	--	--	--	0.315	--			
amine, n,n-diphenyl	122-39-4	0.025		NA			2000	--	--	--	0.875	--			
amine, n-nitroso-di-n-butyl	924-16-3			B2	5.4	0.0016	--	0.12963	--	0.0006	--	6.5E-06			
amine, n-nitroso-di-n-propyl	621-64-7			B2	7		--	0.1	--	--	--	5E-06			
amine, N-nitrosodiphenyl-	86-30-6			B2	0.0049		--	142.857	--	--	--	0.00714			
amitraz	33089-61-1	0.0025		NA			200	--	--	--	0.0875	--			
ammonia	7664-41-7		0.1	NA			--	--	100	--	--	--			
ammonium acetate	631-61-8			D			--	--	--	--	--	--			
ammonium methacrylate	16325-47-6			D			--	--	--	--	--	--			
ammonium sulfamate	7773-06-0	0.2		NA			16000	--	--	--	7	--			
aniline	62-53-3		0.001	IRIS	0.0057		--	122.807	1	--	--	0.00614			
aniline hydrochloride, 2,4,6-trichloro	33663-50-2			C	0.029		--	241.379	--	--	--	0.01207			
aniline hydrochloride, 2,4-dimethyl	21436-96-4			C	0.58		--	12.069	--	--	--	0.0006			
aniline hydrochloride, 4-chloro-2-methyl	3165-93-3			B2	0.46		--	1.52174	--	--	--	7.6E-05			
aniline, 2,4,6-trichloro	634-93-5			C	0.034		--	205.882	--	--	--	0.01029			
aniline, 2,4-dimethyl	95-68-1			C	0.75		--	9.33333	--	--	--	0.00047			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
aniline, 2-chloro	95-51-2			NA			--	--	--	--	--	--			
aniline, 3-chloro	108-42-9			NA			--	--	--	--	--	--			
aniline, 4-chloro	106-47-8	0.004		NA			320	--	--	--	0.14	--			
aniline, 4-chloro-2-methyl	95-69-2			B2	0.58		--	1.2069	--	--	--	6E-05			
aniline, N,N'-diethyl	91-66-7			NA			--	--	--	--	--	--			
aniline, n,n-dimethyl	121-69-7	0.002		NA			160	--	--	--	0.07	--			
aniline, N-ethyl	103-69-5			NA			--	--	--	--	--	--			
anisidine, ortho-	90-04-0			NA			--	--	--	--	--	--			
anthracene	120-12-7	0.3		D			24000	--	--	--	10.5	--			
anthracene, 7,12-dimethylbenz(a)	57-97-6			NA			--	--	--	--	--	--			
antimony	7440-36-0	0.0004		NA			32	--	--	--	0.014	--	0.006		
antimony pentoxide	1314-60-9	0.0005		NA			40	--	--	--	0.0175	--			
antimony potassium tartrate	304-61-0	0.0009		NA			72	--	--	--	0.0315	--			
antimony tetroxide	1332-81-6	0.0004		NA			32	--	--	--	0.014	--			
antimony trioxide	1309-64-4	0.0004		NA			32	--	--	--	0.014	--			
apollo	74115-24-5	0.013		C			1040	--	--	--	0.455	--			
aramite	140-57-8	0.05		B2	0.025	7.1E-06	4000	28	--	0.1408	1.75	0.0014			
aroclor 1016	12674-11-2	7E-05		NA			5.6	--	--	--	0.00245	--			0.014
aroclor 1248	12672-29-6			NA			--	--	--	--	--	--			0.014
aroclor 1254	11097-69-1			NA			--	--	--	--	--	--			
arsenic	7440-38-2	0.0003		A		0.0043	24	--	--	0.0002	0.0105	--	0.05	360	190
arsine	7784-42-1		5E-05	NA			--	--	0.05	--	--	--			
asbestos	1332-21-4			A			--	--	--	--	--	--	7		
assure	76578-14-8	0.009		D			720	--	--	--	0.315	--			
asulam	3337-71-1	0.05		NA			4000	--	--	--	1.75	--			
atrazine	1912-24-9	0.035		C	0.222		2800	31.5315	--	--	1.225	0.00158	0.003		
avermectin b1	65195-55-3	0.0004		NA			32	--	--	--	0.014	--			
azobenzene	103-33-3			B2	0.11	0.000031	--	6.36364	--	0.0323	--	0.00032			
barium	7440-39-3	0.07	5E-04	NA			5600	--	0.5	--	2.45	--	2		
barium cyanide	542-62-1	0.1		NA			8000	--	--	--	3.5	--			
baygon	114-26-1	0.004		NA			320	--	--	--	0.14	--			
bayleton	43121-43-3			NA			--	--	--	--	--	--			
baythroid	68359-37-5			NA			--	--	--	--	--	--			
benefin	1861-40-1	0.3		NA			24000	--	--	--	10.5	--			
benomyl	17804-35-2	0.05		NA			4000	--	--	--	1.75	--			
bentazon	25057-89-0	0.0025		NA			200	--	--	--	0.0875	--			
benzal chloride	98-87-3			NA			--	--	--	--	--	--			
benzaldehyde	100-52-7	0.1		NA			8000	--	--	--	3.5	--			
benzaldehyde cyanohydrin	532-28-5			NA			--	--	--	--	--	--			
benzene	71-43-2			A	0.029	8.3E-06	--	24.1379	--	0.1205	--	0.00121	0.005		
benzene, 1,2,4-tribromo	615-54-3	0.005		NA			400	--	--	--	0.175	--			
benzene, 1,2,4-trichloro	120-82-1	0.01	0.009	D			800	--	9	--	0.35	--	0.07		
benzene, 1,2-dinitro	528-29-0	0.0004		D			32	--	--	--	0.014	--			
benzene, 1,3,5-trinitro	99-35-4	5E-05		NA			4	--	--	--	0.00175	--			
benzene, 1,3-dinitro	99-65-0	0.0001		D			8	--	--	--	0.0035	--			
benzene, 1,4-dibromo	106-37-6	0.01		NA			800	--	--	--	0.35	--			
benzene, 1,4-dinitro	100-25-4	0.0004		NA			32	--	--	--	0.014	--			
benzene, m-chloronitro	88-73-3			NA			--	--	--	--	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
benzene, p-chloronitro	121-73-3			B2	0.018		--	38.8889	--	--	--	0.00194			
benzidine	92-87-5	0.003		A	230	0.067	240	0.00304	--	1E-05	0.105	1.5E-07			
benzidine, 3,3'-dimethyl	119-93-7			B2	9.2		--	0.07609	--	--	--	3.8E-06			
benzidine, 3,3-dimethoxy	119-90-4			B2	0.014		--	50	--	--	--	0.0025			
benzo(a)anthracene	56-55-3			B2	0.73		--	0.9589	--	--	--	4.8E-05			
benzo(a)pyrene	50-32-8			B2	7.3		--	0.09589	--	--	--	4.8E-06	2E-04		
benzo(b)fluoranthene	205-99-2			B2	0.73		--	0.9589	--	--	--	4.8E-05			
benzo(g,h,i)perylene	191-24-2			D			--	--	--	--	--	--			
benzo(j)fluoranthene	205-82-3			NA			--	--	--	--	--	--			
benzo(k)fluoranthene	207-08-9			B2	0.073		--	9.58904	--	--	--	0.00048			
benzoic acid	65-85-0	4		D			320000	--	--	--	140	--			
benzothiazole, 2-(thiocyanomethylthio)-	21564-17-0	0.03		NA			2400	--	--	--	1.05	--			
benzotrichloride	98-07-7			B2	13		--	0.05385	--	--	--	2.7E-06			
benzyl alcohol	100-51-6	0.3		NA			24000	--	--	--	10.5	--			
benzyl chloride	100-44-7			B2	0.17		--	4.11765	--	--	--	0.00021			
beryllium	7440-41-7	0.005		B2	4.3	0.0024	400	0.16279	--	0.0004	0.175	8.1E-06	0.004		
bidrin	141-66-2	0.0001		NA			8	--	--	--	0.0035	--			
biphenthrin	82657-04-3	0.015		NA			1200	--	--	--	0.525	--			
biphenyl, 1,1-	92-52-4	0.05		D			4000	--	--	--	1.75	--			
bis(2-chloroethoxy)methane	111-91-1			D			--	--	--	--	--	--			
bisphenol A	80-05-7	0.05		NA			4000	--	--	--	1.75	--			
boron	7440-42-8	0.09	0.02	NA			7200	--	20	--	3.15	--			
boron trifluoride	7637-07-2		7E-04	NA			--	--	0.7	--	--	--			
bromoacetone	598-31-2			NA			--	--	--	--	--	--			
bromochloromethane	74-97-5			D			--	--	--	--	--	--			
bromodichloromethane	75-27-4	0.02		B2	0.06		1600	11.6667	--	--	0.7	0.00058	0.1		
bromodifluoromethane	1511-62-2			NA			--	--	--	--	--	--			
bromoform	75-25-2	0.02		B2	0.00793	1.1E-06	1600	88.2724	--	0.9091	0.7	0.00441	0.1		
bromomethane	74-83-9	0.0014	0.005	D			112	--	5	--	0.049	--			
bromophos	2104-96-3	0.005		NA			400	--	--	--	0.175	--			
bromotrichloromethane	75-62-7			D			--	--	--	--	--	--			
bromoxynil	1689-84-5	0.02		NA			1600	--	--	--	0.7	--			
bromoxynil octanoate	1689-99-2	0.02		NA			1600	--	--	--	0.7	--			
busan 77	31512-74-0			NA			--	--	--	--	--	--			
busan 90	2491-38-5			NA			--	--	--	--	--	--			
butadiene, 1,3-	106-99-0			B2		0.00028	--	--	--	0.0036	--	--			
butadiene, 2-chloro-1,3-	126-99-8	0.02	0.007	NA			1600	--	7	--	0.7	--			
butane, 1-chloro	109-69-3	0.4		D			32000	--	--	--	14	--			
butane, 2-chloro	78-86-4			D			--	--	--	--	--	--			
butanol, 1-	71-36-3	0.1		D			8000	--	--	--	3.5	--			
butanone, 2-	78-93-3	0.6	1	D			48000	--	1000	--	21	--			
butene, 1,4-dichloro-2-	764-41-0			B2		0.0026	--	--	--	0.0004	--	--			
butylate	2008-41-5	0.05		NA			4000	--	--	--	1.75	--			
butylchloride, t-	507-20-0			D			--	--	--	--	--	--			
butylphthalyl butylglycolate (BPBG)	85-70-1	1		NA			80000	--	--	--	35	--			
butyric acid, 4-(2,4-dichlorophenoxy)	94-82-6	0.008		NA			640	--	--	--	0.28	--			
butyric acid, 4-(2-methyl-4-chlorophenoxy)	94-81-5	0.01		NA			800	--	--	--	0.35	--			
butyrolactone, gamma-	96-48-0			NA			--	--	--	--	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
cacodylic acid	75-60-5	0.003		D			240	--	--	--	0.105	--			
cadmium (carcinogenicity)	7440-43-9			B1		0.0018	--	--	--	0.0006	--	--	0.005	3.9	1.1
cadmium (food)	7440-43-9	0.001		NA			80	--	--	--	0.035	--	0.005	3.9	1.1
cadmium (water)	7440-43-9	0.0005		NA			40	--	--	--	0.0175	--	0.005	3.9	1.1
calcium cyanide	592-01-8	0.04		NA			3200	--	--	--	1.4	--			
caprolactam	105-60-2	0.5		NA			40000	--	--	--	17.5	--			
captafol	2425-06-1	0.002		C	0.0086		160	813.953	--	--	0.07	0.0407			
captan	133-06-2	0.13		B2	0.0035		10400	200	--	--	4.55	0.01			
carbaryl	63-25-2	0.1		NA			8000	--	--	--	3.5	--			
carbazole	86-74-8			B2	0.02		--	35	--	--	--	0.00175			
carbofuran	1563-66-2	0.005		NA			400	--	--	--	0.175	--	0.04		
carbon disulfide	75-15-0	0.1	0.01	NA			8000	--	10	--	3.5	--			
carbon tetrachloride	56-23-5	0.0007		B2	0.13	0.000015	56	5.38462	--	0.0667	0.0245	0.00027	0.005		
carbonyl sulfide	463-58-1			NA			--	--	--	--	--	--			
carbosulfan	55285-14-8	0.01		NA			800	--	--	--	0.35	--			
carboxin	5234-68-4	0.1		NA			8000	--	--	--	3.5	--			
chloral	75-87-6	0.002		NA			160	--	--	--	0.07	--			
chloral hydrate	302-17-0			NA			--	--	--	--	--	--			
chloramben	133-90-4	0.015		NA			1200	--	--	--	0.525	--			
chloranil	118-75-2			C	0.403		--	17.3697	--	--	--	0.00087			
chlordane	57-74-9	6E-05		B2	1.3	0.00037	4.8	0.53846	--	0.0027	0.0021	2.7E-05	0.002	2.4	0.0043
chloride, ethyl	75-00-3		10	NA			--	--	10000	--	--	--			
chlorimuron-ethyl	90982-32-4	0.02		NA			1600	--	--	--	0.7	--			
chlorine	7782-50-5			NA			--	--	--	--	--	--			
chlorine cyanide	506-77-4	0.05		NA			4000	--	--	--	1.75	--			
chlorine dioxide	10049-04-4		2E-04	NA			--	--	0.2	--	--	--			
chlorite (sodium salt)	7758-19-2			NA			--	--	--	--	--	--			
chloroacetaldehyde	107-20-0			NA			--	--	--	--	--	--			
chloroacetic acid	79-11-8	0.002		NA			160	--	--	--	0.07	--			
chloroacetophenone, 2-	532-27-4		3E-05	NA			--	--	0.03	--	--	--			
chlorobenzene	108-90-7	0.02	0.02	D			1600	--	20	--	0.7	--	0.1		
chlorobenzilate	510-15-6	0.02		B2	0.27	0.000078	1600	2.59259	--	0.0128	0.7	0.00013			
chlorobenzoic acid, p-	74-11-3	0.2		NA			16000	--	--	--	7	--			
chlorobenzotrifluoride, 4-	98-56-6	0.02		NA			1600	--	--	--	0.7	--			
chlorocyclohexane, 1,2,3,4,5-pentabromo-6-	87-84-3			C	0.26		--	26.9231	--	--	--	0.00135			
chlorocyclopentadiene	41851-50-7			D			--	--	--	--	--	--			
chlorodifluoromethane	75-45-6		50	NA			--	--	50000	--	--	--			
chloroform	67-66-3	0.01		B2	0.0061	0.000023	800	114.754	--	0.0435	0.35	0.00574	0.1		
chloromethane	74-87-3			C	0.013	1.8E-06	--	538.462	--	5.5556	--	0.02692			
chloronaphthalene, beta-	91-58-7	0.08		NA			6400	--	--	--	2.8	--			
chlorophenoxyacetic acid, 2-methyl-4-	94-74-6	0.0005		NA			40	--	--	--	0.0175	--			
chloropropane, 1,2-dibromo-3-	96-12-8		2E-04	B2	1.4	6.9E-07	--	0.5	0.2	1.4493	--	2.5E-05	2E-04		
chlorpropham	101-21-3	0.2		NA			16000	--	--	--	7	--			
chlorpyrifos	2921-88-2	0.003		NA			240	--	--	--	0.105	--			
chlorpyrifos methyl	5598-13-0	0.01		NA			800	--	--	--	0.35	--			
chlorsulfuron	64902-72-3	0.05		NA			4000	--	--	--	1.75	--			
chlorthalonil	1897-45-6	0.015		B2	0.011		1200	63.6364	--	--	0.525	0.00318			
chlorthiophos	60238-56-4	0.0008		NA			64	--	--	--	0.028	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
chromium (hexavalent)	18540-29-9	0.005		A		0.012	400	--	--	8E-05	0.175	--	0.1	16	11
chromium (trivalent)	16065-83-1	1		NA			80000	--	--	--	35	--	0.1	1700	210
chrysene	218-01-9			B2	0.0073		--	95.8904	--	--	--	0.00479			
coke oven emissions	8007-45-2			A		0.00062	--	--	--	0.0016	--	--			
copper	7440-50-8	0.037		D			2960	--	--	--	1.295	--	1.3	18	12
copper cyanide	544-92-3	0.005		NA			400	--	--	--	0.175	--			
creosote, coal tar	8001-58-9			B1			--	--	--	--	--	--			
cresol, 2,6-dinitro-p-	609-93-8			NA			--	--	--	--	--	--			
cresol, 4,6-dinitro-o-	534-52-1			NA			--	--	--	--	--	--			
cresol, p-chloro-m-	59-50-7			NA			--	--	--	--	--	--			
crotonaldehyde	123-73-9			C	1.9		--	3.68421	--	--	--	0.00018			
cumene	98-82-8	0.04	0.009	NA			3200	--	9	--	1.4	--			
cyanazine	21725-46-2	0.002		C	0.84		160	8.33333	--	--	0.07	0.00042			
cyanide	57-12-5	0.02		D			1600	--	--	--	0.7	--	0.2	22	5.2
cyanogen	460-19-5	0.04		NA			3200	--	--	--	1.4	--			
cyanogen bromide	506-68-3	0.09		NA			7200	--	--	--	3.15	--			
cycloate	1134-23-2			NA			--	--	--	--	--	--			
cyclohexanol	108-93-0			NA			--	--	--	--	--	--			
cyclohexanone	108-94-1	5		NA			400000	--	--	--	175	--			
cyclohexene, 4-vinyl-1-	100-40-3			NA			--	--	--	--	--	--			
cyclohexylamine	108-91-8	0.2		NA			16000	--	--	--	7	--			
cyclopentadiene	542-92-7			NA			--	--	--	--	--	--			
cyhalothrin/karate	68085-85-8	0.005		NA			400	--	--	--	0.175	--			
cypermethrin	52315-07-8	0.01		NA			800	--	--	--	0.35	--			
cyromazine	66125-27-8	0.0075		NA			600	--	--	--	0.2625	--			
dacthal	1861-32-1	0.5		NA			40000	--	--	--	17.5	--			
dalapon	75-99-0	0.03		NA			2400	--	--	--	1.05	--	0.2		
danitol	39515-41-8			NA			--	--	--	--	--	--			
ddd, 4,4'-	72-54-8			B2	0.24		--	2.91667	--	--	--	0.00015			
dde, 4,4'-	72-55-9			B2	0.34		--	2.05882	--	--	--	0.0001			
ddt, 4,4'-	50-29-3	0.0005		B2	0.34	0.000097	40	2.05882	--	0.0103	0.0175	0.0001		1.1	0.001
decabromodiphenyl ether	1163-19-5	0.01		C			800	--	--	--	0.35	--			
demeton	8065-48-3	4E-05		NA			3.2	--	--	--	0.0014	--			
di(2-ethylhexyl)adipate	103-23-1	0.6		C	0.0012		48000	5833.33	--	--	21	0.29167	0.4		
diallate	2303-16-4			B2	0.061		--	11.4754	--	--	--	0.00057			
diazinon	333-41-5	0.0009		NA			72	--	--	--	0.0315	--			
diazomethane	334-88-3			NA			--	--	--	--	--	--			
dibenz(a,h)anthracene	53-70-3			B2	7.3		--	0.09589	--	--	--	4.8E-06			
dibenzofuran	132-64-9			D			--	--	--	--	--	--			
dibenzofurans, brominated	NO CASRN			D			--	--	--	--	--	--			
dibromochloromethane	124-48-1	0.02		C	0.084		1600	83.3333	--	--	0.7	0.00417	0.1		
dibromodichloromethane	594-18-3			D			--	--	--	--	--	--			
dibromodiphenyl ether, p,p'-	2050-47-7			D			--	--	--	--	--	--			
dibromoethane, 1,2-	106-93-4	0.0002		B2	85	0.00022	16	0.00824	--	0.0045	0.007	4.1E-07	5E-05		
dicamba	1918-00-9	0.03		NA			2400	--	--	--	1.05	--			
dichlorobenzene, 1,2-	95-50-1	0.09	0.2	D			7200	--	200	--	3.15	--	0.6		
dichlorobenzene, 1,3-	541-73-1			D			--	--	--	--	--	--			
dichlorobenzene, 1,4-	106-46-7		0.8	C	0.024		--	291.667	800	--	--	0.01458	0.075		

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
dichlorobenzidine, 3,3-	91-94-1			B2	0.45		--	1.55556	--	--	--	7.8E-05			
dichlorodifluoromethane	75-71-8	0.2	0.2	NA			16000	--	200	--	7	--			
dichloroethane, 1,1-	75-34-3	0.1	0.5	C			8000	--	500	--	3.5	--			
dichloroethane, 1,2-	107-06-2			B2	0.091	0.000026	--	7.69231	--	0.0385	--	0.00038	0.005		
dichloroethene, 1,1-	75-35-4	0.009		C	0.6	0.00005	720	11.6667	--	0.2	0.315	0.00058	0.007		
dichloroethene, 1,2- (mixed isomers)	540-59-0	0.009		NA			720	--	--	--	0.315	--			
dichloroethene, cis-1,2-	156-59-2	0.01		D			800	--	--	--	0.35	--	0.07		
dichloroethene, trans-1,2-	156-60-5	0.02		NA			1600	--	--	--	0.7	--	0.1		
dichlorophenol, 2,3-	576-24-9			NA			--	--	--	--	--	--			
dichlorophenol, 2,4-	120-83-2	0.003		NA			240	--	--	--	0.105	--			
dichlorophenol, 2,5-	583-78-8			NA			--	--	--	--	--	--			
dichlorophenol, 2,6-	87-65-0			NA			--	--	--	--	--	--			
dichlorophenol, 3,4-	95-77-2			NA			--	--	--	--	--	--			
dichlorophenol, 3,5-	591-35-5			NA			--	--	--	--	--	--			
dichlorophenoxyacetic acid, 2,4-	94-75-7	0.01		NA			800	--	--	--	0.35	--	0.07		
dichloropropane, 1,1-	78-99-9			NA			--	--	--	--	--	--			
dichloropropane, 1,2-	78-87-5		0.004	B2	0.068		--	10.2941	4	--	--	0.00051	0.005		
dichloropropane, 1,3-	142-28-9			NA			--	--	--	--	--	--			
dichloropropane, 2,2--	594-20-7			NA			--	--	--	--	--	--			
dichloropropanol, 2,3-	616-23-9	0.003		NA			240	--	--	--	0.105	--			
dichloropropene, 1,3-	542-75-6	0.0003	0.02	B2	0.18	0.000037	24	3.88889	20	0.027	0.0105	0.00019			
dichlorprop	120-36-5			NA			--	--	--	--	--	--			
dichlorvos	62-73-7	0.0005		B2	0.29		40	2.41379	--	--	0.0175	0.00012			
dicofol	115-32-2			NA			--	--	--	--	--	--			
dicyclopentadiene	77-73-6	0.03	2E-04	NA			2400	--	0.2	--	1.05	--			
dieldrin	60-57-1	5E-05		B2	16	0.0046	4	0.04375	--	0.0002	0.00175	2.2E-06		2.5	0.0019
diesel engine emissions	NO CASRN		0.005	NA			--	--	5	--	--	--			
diethyl sulfate	64-67-5			NA			--	--	--	--	--	--			
diethylene glycol dinitrate	693-21-0			D			--	--	--	--	--	--			
diethylformamide	617-84-5	0.011		NA			880	--	--	--	0.385	--			
diethylphthalate	84-66-2	0.8		D			64000	--	--	--	28	--			
diethylstilbesterol	56-53-1			A	4700		--	0.00015	--	--	--	7.4E-09			
difenzoquat	43222-48-6	0.08		NA			6400	--	--	--	2.8	--			
diflubenzuron	35367-38-5	0.02		NA			1600	--	--	--	0.7	--			
diisopropyl methylphosphonate	1445-75-6	0.08		D			6400	--	--	--	2.8	--			
dimethipin	55290-64-7	0.02		C			1600	--	--	--	0.7	--			
dimethoate	60-51-5	0.0002		NA			16	--	--	--	0.007	--			
dimethylamine	124-40-3			NA			--	--	--	--	--	--			
dinoseb	88-85-7	0.001		D			80	--	--	--	0.035	--	0.007		
dioxane, 1,4-	123-91-1			B2	0.011		--	63.6364	--	--	--	0.00318			
dioxin (2,3,7,8-TCDD)	1746-01-6			B2	150000	0	--	4.7E-06	--	--	--	2.3E-10	3E-08		
diphenamid	957-51-7	0.03		NA			2400	--	--	--	1.05	--			
diquat	85-00-7			NA			--	--	--	--	--	--	0.02		
direct black 38	1937-37-7			A	8.6		--	0.0814	--	--	--	4.1E-06			
direct blue 6	2602-46-2			A	8.1		--	0.08642	--	--	--	4.3E-06			
direct brown 95	16071-86-6			A	9.3		--	0.07527	--	--	--	3.8E-06			
direct lightfast blue	4399-55-7			NA			--	--	--	--	--	--			
direct sky blue 6B	2610-05-1			B2			--	--	--	--	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
disulfoton	298-04-4	4E-05		NA			3.2	--	--	--	0.0014	--			
dithiane, 1,4-	505-29-3	0.01		D			800	--	--	--	0.35	--			
dithiopropylcarbamate, s-ethyl-	759-94-4	0.025		NA			2000	--	--	--	0.875	--			
diuron	330-54-1	0.002		NA			160	--	--	--	0.07	--			
dodecanoate, 2-ethoxyethanol	106-13-8			NA			--	--	--	--	--	--			
dodine	2439-10-3	0.004		NA			320	--	--	--	0.14	--			
endosulfan	115-29-7	5E-05		NA			4	--	--	--	0.00175	--			
endothall	145-73-3	0.02		NA			1600	--	--	--	0.7	--	0.1		
endrin	72-20-8	0.0003		D			24	--	--	--	0.0105	--	0.002	0.18	0.0023
environmental tobbaco smoke	NO CAS RN			NA			--	--	--	--	--	--			
epichlorohydrin	106-89-8	0.002	0.001	B2	0.0099	1.2E-06	160	70.7071	1	0.8333	0.07	0.00354	0.01		
epoxybutane, 1,2-	106-88-7		0.02	NA			--	--	20	--	--	--			
ethane, 1,1,1-trichloro	71-55-6			D			--	--	--	--	--	--	0.2		
ethane, 1,1,2-trichloro	79-00-5	0.004		C	0.057	0.000016	320	122.807	--	0.625	0.14	0.00614	0.005		
ethane, 1,1,2-trichloro-1,2,2-trifluoro	76-13-1	30	30	NA			2400000	--	30000	--	1050	--			
ethanol acetate, 2-ethoxy	111-15-9	0.3		NA			24000	--	--	--	10.5	--			
ethanol, 2-ethoxy	110-80-5	0.4	0.2	NA			32000	--	200	--	14	--			
ethephon	16672-87-0	0.005		NA			400	--	--	--	0.175	--			
ether, 2,4,4'-trichloro-2'-hydroxydiphenyl	3380-34-5			NA			--	--	--	--	--	--			
ether, 2-chloroethylvinyl	110-75-8			NA			--	--	--	--	--	--			
ether, 4-bromophenylphenyl	101-55-3			D			--	--	--	--	--	--			
ether, bis(2-chloroethyl)	111-44-4			B2	1.1	0.00033	--	0.63636	--	0.003	--	3.2E-05			
ether, bis(2-chloroisopropyl)	39638-32-9	0.04		C	0.07	0.00001	3200	100	--	1	1.4	0.005			
ether, bis(chloromethyl)	542-88-1			A	220	0.062	--	0.00318	--	2E-05	--	1.6E-07			
ether, chloromethylmethyl	107-30-2			A			--	--	--	--	--	--			
ether, diethylene glycol monobutyl	112-34-5		0.02	NA			--	--	20	--	--	--			
ether, diethylene glycol monoethyl	111-90-0	2		NA			160000	--	--	--	70	--			
ether, ethyl	60-29-7	0.2		NA			16000	--	--	--	7	--			
ether, ethylene glycol monobutyl	111-76-2		0.02	NA			--	--	20	--	--	--			
ether, nonabromodiphenyl	63936-56-1			D			--	--	--	--	--	--			
ether, propylene glycol monoethyl	52125-53-8	0.7		NA			56000	--	--	--	24.5	--			
ether, propylene glycol monomethyl	107-98-2	0.7	2	NA			56000	--	2000	--	24.5	--			
ethion	563-12-2			NA			--	--	--	--	--	--			
ethoprop	13194-48-4			NA			--	--	--	--	--	--			
ethoxyethanol phosphated, 2-	68554-00-7			NA			--	--	--	--	--	--			
ethyl carbamate	51-79-6			NA			--	--	--	--	--	--			
ethyl p-nitrophenyl phenylphosphorothioate	2104-64-5	1E-05		NA			0.8	--	--	--	0.00035	--			
ethylbenzene	100-41-4	0.1	1	D			8000	--	1000	--	3.5	--	0.7		
ethylene cyanohydrin	109-74-8	0.3		NA			24000	--	--	--	10.5	--			
ethylene diamine	107-15-3	0.02		D			1600	--	--	--	0.7	--			
ethylene glycol	107-21-1	2		NA			160000	--	--	--	70	--			
ethylene oxide	75-21-8			B1	1.02	0.0001	--	0.68627	--	0.01	--	3.4E-05			
ethylene thiourea	96-45-7	8E-05		B2	0.6		6.4	1.16667	--	--	0.0028	5.8E-05			
ethyleneimine	151-56-4			NA			--	--	--	--	--	--			
ethylnitrosourea	759-73-9			B2	140		--	0.005	--	--	--	2.5E-07			
ethylphthalyl ethylglycolate (EPEG)	84-72-0	3		NA			240000	--	--	--	105	--			
express	101200-48-	0.008		NA			640	--	--	--	0.28	--			
fenamiphos	22224-92-6	0.0003		NA			20	--	--	--	0.00875	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
fluometuron	2164-17-2	0.013		NA			1040	--	--	--	0.455	--			
fluoranthene	206-44-0	0.04		D			3200	--	--	--	1.4	--			
fluorene	86-73-7	0.04		D			3200	--	--	--	1.4	--			
fluorine (soluble fluoride)	7782-41-4	0.06		NA			4800	--	--	--	2.1	--	4		
fluridone	59756-60-4	0.08		NA			6400	--	--	--	2.8	--			
flurprimidol	56425-91-3	0.02		NA			1600	--	--	--	0.7	--			
flutolanil	66332-96-5	0.06		NA			4800	--	--	--	2.1	--			
fluvalinate	69409-94-5	0.01		NA			800	--	--	--	0.35	--			
folpet	133-07-3	0.1		B2	0.0035		8000	200	--	--	3.5	0.01			
fomesafen	72178-02-0			C	0.19		--	36.8421	--	--	--	0.00184			
fonofos	944-22-9			NA			--	--	--	--	--	--			
formaldehyde	50-00-0	0.2		B1		0.000013	16000	--	--	0.0769	7	--			
formaldehyde cyanohydrin	107-16-4			NA			--	--	--	--	--	--			
formamide, n,n-dimethyl	68-12-2	0.1	0.03	NA			8000	--	30	--	3.5	--			
formic acid	64-18-6	2		NA			160000	--	--	--	70	--			
fosetyl-al	39148-24-8			NA			--	--	--	--	--	--			
furan	110-00-9	0.001		NA			80	--	--	--	0.035	--			
furazolidone	67-45-8			B2	3.8		--	0.18421	--	--	--	9.2E-06			
furfural	98-01-1	0.003	0.05	NA			240	--	50	--	0.105	--			
furium	531-82-8			B2	50		--	0.014	--	--	--	7E-07			
furmecyclox	60568-05-0			B2	0.03		--	23.3333	--	--	--	0.00117			
glufosinate-ammonium	77182-82-2	0.0004		NA			32	--	--	--	0.014	--			
glycidaldehyde	765-34-4	0.0004	0.001	B2			32	--	1	--	0.014	--			
glyphosate	1071-83-6			NA			--	--	--	--	--	--	0.7		
halosulfuron methyl	100784-20-1			NA			--	--	--	--	--	--			
haloxyfop-methyl	69806-40-2	5E-05		NA			4	--	--	--	0.00175	--			
harmony	79277-27-3	0.013		NA			1040	--	--	--	0.455	--			
heptachlor	76-44-8	0.0005		B2	4.5	0.0013	40	0.15556	--	0.0008	0.0175	7.8E-06	4E-04	0.52	0.0038
heptachlor epoxide	1024-57-3	1E-05		B2	9.1	0.0026	1.04	0.07692	--	0.0004	0.00046	3.8E-06	2E-04	0.52	0.0038
heptafluoropropane, 1,1,1,2,3,3,3-	431-89-0			NA			--	--	--	--	--	--			
heptane, n-	142-82-5			D			--	--	--	--	--	--			
hexabromobenzene	87-82-1	0.002		NA			160	--	--	--	0.07	--			
hexabromodiphenyl ether	36483-60-0			D			--	--	--	--	--	--			
hexachlorobenzene	118-74-1	0.0008		B2	1.6	0.00046	64	0.4375	--	0.0022	0.028	2.2E-05	0.001		
hexachlorobutadiene	87-68-3	0.0002		C	0.078	0.000022	16	89.7436	--	0.4545	0.007	0.00449			
hexachlorocyclohexane, alpha-	319-84-6			B2	6.3	0.0018	--	0.11111	--	0.0006	--	5.6E-06			
hexachlorocyclohexane, beta-	319-85-7			C	1.8	0.00053	--	3.88889	--	0.0189	--	0.00019			
hexachlorocyclohexane, delta-	319-86-8			D			--	--	--	--	--	--			
hexachlorocyclohexane, epsilon-	6108-10-7			D			--	--	--	--	--	--			
hexachlorocyclohexane, gamma-	58-89-9	0.0003		B2 - C	1.3		24	0.53846	--	--	0.0105	2.7E-05	2E-04	2	0.08
hexachlorocyclohexane, technical	608-73-1			B2	1	0.00051	--	0.7	--	0.002	--	3.5E-05			
hexachlorocyclopentadiene	77-47-4	0.007	7E-05	D			560	--	0.07	--	0.245	--	0.05		
hexachlorodibenzo-p-dioxin	19408-74-3			B2	6200	1.3	--	0.00011	--	8E-07	--	5.6E-09			
hexachloroethane	67-72-1	0.001		C	0.014	0.000004	80	500	--	2.5	0.035	0.025			
hexachlorophene	70-30-4	0.0003		NA			24	--	--	--	0.0105	--			
hexamethylene diamine	124-09-4			NA			--	--	--	--	--	--			
hexane, n-	110-54-3	0.06	0.2	NA			4800	--	200	--	2.1	--			
hexanone, 2-	591-78-6			NA			--	--	--	--	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
hexazinone	51235-04-2	0.033		NA			2640	--	--	--	1.155	--			
hmx	2691-41-0	0.05		D			4000	--	--	--	1.75	--			
hydrazine	302-01-2			B2	3	0.0049	--	0.23333	--	0.0002	--	1.2E-05	400		
hydrazine sulfate	10034-93-2			B2	3	0.0049	--	0.23333	--	0.0002	--	1.2E-05	400		
hydrazine, 1,1-dimethyl	57-14-7			B2	2.6	0.001	--	0.26923	--	0.001	--	1.3E-05			
hydrazine, 1,2-diethyl	1615-80-1			NA			--	--	--	--	--	--			
hydrazine, 1,2-dimethyl	540-73-8			B2			--	--	--	--	--	--			
hydrazine, 1,2-diphenyl	122-66-7			B2	0.8	0.00022	--	0.875	--	0.0045	--	4.4E-05			
hydrogen chloride	7647-01-0		0.007	NA			--	--	7	--	--	--			
hydrogen cyanide	74-90-8			NA			--	--	--	--	--	--			
hydrogen sulfide	7738-06-4	0.003	9E-04	NA			240	--	0.9	--	0.105	--			
hydroquinone	123-31-9	0.04		NA			3200	--	--	--	1.4	--			
imazalil	35554-44-0			NA			--	--	--	--	--	--			
imazaquin	81335-37-7			NA			--	--	--	--	--	--			
indeno(1,2,3-cd)pyrene	193-39-5			B2	0.73		--	0.9589	--	--	--	4.8E-05			
iprodione	36734-19-7	0.04		NA			3200	--	--	--	1.4	--			
iron	7439-89-6			NA			--	--	--	--	--	--			
isobutyl alcohol	78-83-1	0.3		NA			24000	--	--	--	10.5	--			
isophorone	78-59-1	0.2		C	0.00095		16000	7368.42	--	--	7	0.36842			
isopropalin	33820-53-0	0.015		NA			1200	--	--	--	0.525	--			
isopropyl methyl phosphonic acid	1832-54-8	0.1		D			8000	--	--	--	3.5	--			
isoxaben	82558-50-7	0.05		C			4000	--	--	--	1.75	--			
lactofen	77501-63-4	0.002		NA			160	--	--	--	0.07	--			
lactonitrile	78-97-7			NA			--	--	--	--	--	--			
lead	7439-92-1			B2			--	--	--	--	--	--	0.015	82	3.2
limonene, d-	5989-27-5			NA			--	--	--	--	--	--			
linuron	330-55-2	0.002		C			160	--	--	--	0.07	--			
londax	83055-99-6			NA			--	--	--	--	--	--			
malanonitrile	109-77-3	2E-05		NA			1.6	--	--	--	0.0007	--			
malathion	121-75-5	0.02		NA			1600	--	--	--	0.7	--			
maleic anhydride	108-31-6	0.1		NA			8000	--	--	--	3.5	--			
maleic hydrazide	123-33-1	0.5		NA			40000	--	--	--	17.5	--			
mancozeb	8018-01-7	0.03		NA			2400	--	--	--	1.05	--			
maneb	12427-38-2	0.005		NA			400	--	--	--	0.175	--			
manganese (food)	7439-96-5	0.14	4E-04	D			11200	--	0.4	--	4.9	--			
manganese (water)	7439-96-5	0.005	4E-04	D			400	--	0.4	--	0.175	--			
mephosfolan	950-10-7	9E-05		NA			7.2	--	--	--	0.00315	--			
mepiquat chloride	24307-26-4	0.03		NA			2400	--	--	--	1.05	--			
mercuric chloride	7487-94-7			NA			--	--	--	--	--	--			
mercury	7439-97-6	0.0003	3E-04	D			24	--	0.3	--	0.0105	--	0.002	2.4	0.012
merphos	150-50-5	3E-05		NA			2.4	--	--	--	0.00105	--			
merphos oxide	78-48-8	3E-05		NA			2.4	--	--	--	0.00105	--			
metalaxyl	57837-19-1			NA			--	--	--	--	--	--			
methacrylate, 2-ethoxyethyl	2370-63-0			NA			--	--	--	--	--	--			
methacrylate, ethyl	97-63-2	0.09		NA			7200	--	--	--	3.15	--			
methacrylonitrile	126-98-7	0.0001	7E-04	NA			8	--	0.7	--	0.0035	--			
methamidiphos	10265-92-6	5E-05		NA			4	--	--	--	0.00175	--			
methanol	67-56-1	0.5		NA			40000	--	--	--	17.5	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
methidathion	950-37-8	0.001		C			80	--	--	--	0.035	--			
methomyl	16752-77-5	0.025		NA			2000	--	--	--	0.875	--			
methoxychlor	72-43-5	0.005		D			400	--	--	--	0.175	--	0.04		
methoxyethanol acetate, 2-	110-49-6	0.002		NA			160	--	--	--	0.07	--			
methoxyethanol, 2-	109-86-4	0.001	0.02	NA			80	--	20	--	0.035	--			
methyl acetate	79-20-9	1		NA			80000	--	--	--	35	--			
methyl acrylate	96-33-3	0.03		D			2400	--	--	--	1.05	--			
methyl chlorocarbonate	79-22-1			NA			--	--	--	--	--	--			
methyl ethyl ketone peroxide	1338-23-4			NA			--	--	--	--	--	--			
methyl hydrazine	60-34-4			B2	1.1		--	0.63636	--	--	--	3.2E-05			
methyl iodide	77-88-4			NA			--	--	--	--	--	--			
methyl isocyanate	624-83-9			NA			--	--	--	--	--	--			
methyl mercury	22967-92-6	0.0003		NA			24	--	--	--	0.0105	--			
methyl methacrylate	80-62-6	0.08		NA			6400	--	--	--	2.8	--			
methyl parathion	298-00-0	0.0003		NA			20	--	--	--	0.00875	--			
methyl styrene	25013-15-4	0.006	0.04	NA			480	--	40	--	0.21	--			
methyl styrene, alpha-	98-83-9	0.07		NA			5600	--	--	--	2.45	--			
methyl tert-butyl ether	1634-04-4		3	NA			--	--	3000	--	--	--			
methylaniline hydrochloride, 2-	636-21-5			B2	0.18		--	3.88889	--	--	--	0.00019			
methylaniline, 2-	95-53-4			B2	0.24		--	2.91667	--	--	--	0.00015			
methylcholanthracene, 3-	56-49-5			NA			--	--	--	--	--	--			
methylcyclohexane	108-87-2		3	NA			--	--	3000	--	--	--			
methylene chloride	75-09-2	0.06	3	B2	0.0075	4.7E-07	4800	93.3333	3000	2.1277	2.1	0.00467	0.005		
methylene-bis(2-chloroaniline), 4,4'-	101-14-4	0.0007		B2	0.13	0.000037	56	5.38462	--	0.027	0.0245	0.00027			
methylene-bis(N,N-dimethyl)aniline, 4,4'-	101-61-1			B2	0.046		--	15.2174	--	--	--	0.00076			
methylenebisbenzenamine, 4,4'-	101-77-9			B2	0.25		--	2.8	--	--	--	0.00014			
methylenediphenyl isocyanate, 4,4'-	101-68-8		2E-05	NA			--	--	0.02	--	--	--			
methylnitrosourea	684-93-5			B2			--	--	--	--	--	--			
methylphenol, 2-	95-48-7	0.05		C			4000	--	--	--	1.75	--			
methylphenol, 3-	108-39-4	0.05		C			4000	--	--	--	1.75	--			
methylphenol, 4-	106-44-5	0.005		C			400	--	--	--	0.175	--			
metolachlor	51218-45-2	0.15		NA			12000	--	--	--	5.25	--			
metribuzin	21087-64-9	0.025		D			2000	--	--	--	0.875	--			
mirex	2385-85-5	0.0002		B2	1.8		16	0.38889	--	--	0.007	1.9E-05			
molinate	2212-67-1	0.002		NA			160	--	--	--	0.07	--			
molybdenum	7439-98-7	0.005		NA			400	--	--	--	0.175	--			
monochloramine	10599-90-3	0.1		D			8000	--	--	--	3.5	--			
naled	300-76-5			NA			--	--	--	--	--	--			
naphthalene	91-20-3			D			--	--	--	--	--	--			
naphthol hydrochloride, 1-amino-2-	1198-27-2			NA			--	--	--	--	--	--			
naphthol, 1-amino-2-	2834-92-6			NA			--	--	--	--	--	--			
naphthoquinone, 1,4-	130-15-4			NA			--	--	--	--	--	--			
napropamide	15299-99-7	0.1		NA			8000	--	--	--	3.5	--			
niagra blue 4B	2429-74-5			B2			--	--	--	--	--	--			
nickel	7440-02-0	0.02		NA			1600	--	--	--	0.7	--	0.1	1400	160
nickel carbonyl	13463-39-3			B2			--	--	--	--	--	--			
nickel refinery dust	NO CASRN			A		0.00024	--	--	--	0.0042	--	--			
nickel subsulfide	12035-72-2			A		0.00048	--	--	--	0.0021	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
nicotinonitrile	100-54-9			NA			--	--	--	--	--	--			
nitrapyrin	1929-82-4			NA			--	--	--	--	--	--			
nitrate	14797-55-8	1.6		NA			128000	--	--	--	56	--	10		
nitric oxide	10102-43-9	0.1		NA			8000	--	--	--	3.5	--			
nitrite	14797-65-0	0.1		NA			8000	--	--	--	3.5	--	1		
nitroaniline, 2-methoxy-5-	99-59-2			B2	0.046		--	15.2174	--	--	--	0.00076			
nitroaniline, 2-methyl-5-	99-55-8			C	0.033		--	212.121	--	--	--	0.01061			
nitroaniline, m-	99-09-2		2E-04	NA			--	--	0.2	--	--	--			
nitroaniline, o-	88-74-4		2E-04	NA			--	--	0.2	--	--	--			
nitroaniline, p-	100-01-6			NA			--	--	--	--	--	--			
nitrobenzene	98-95-3	0.0005	0.002	D			40	--	2	--	0.0175	--			
nitrofurantoin	67-20-9	0.07		NA			5600	--	--	--	2.45	--			
nitrofurazone	59-87-0			B2	1.5		--	0.46667	--	--	--	2.3E-05			
nitrogen dioxide	10102-44-0	1		NA			80000	--	--	--	35	--			
nitroguanidine	556-88-7	0.1		D			8000	--	--	--	3.5	--			
nitromethane	75-52-5			NA			--	--	--	--	--	--			
nitrosodiethanolamine, N-	1116-54-7			B2	2.8		--	0.25	--	--	--	1.3E-05			
nitrosodiethylamine, N-	55-18-5			B2	150	0.043	--	0.00467	--	2E-05	--	2.3E-07			
nitrosodimethylamine, N-	62-75-9			B2	51	0.014	--	0.01373	--	7E-05	--	6.9E-07			
nitrosodiphenylamine, p-	156-10-5			NA			--	--	--	--	--	--			
nitrosomethylethylamine, N-	10595-95-6			B2	22		--	0.03182	--	--	--	1.6E-06			
nitrosomethylvinylamine, N-	4549-40-0			B2			--	--	--	--	--	--			
nitrosopyrrolidine, N-	930-55-2			B2	2.1	0.00061	--	0.33333	--	0.0016	--	1.7E-05			
nitrotoluene, m-	99-08-1	0.01		NA			800	--	--	--	0.35	--			
nitrotoluene, o-	88-72-2	0.01		NA			800	--	--	--	0.35	--			
nitrotoluene, p-	99-99-0	0.01		NA			800	--	--	--	0.35	--			
norflurazon	27314-13-2			NA			--	--	--	--	--	--			
nustar	85509-19-9	0.0007		NA			56	--	--	--	0.0245	--			
octabromodiphenyl ether	32536-52-0	0.003		D			240	--	--	--	0.105	--			
octamethylpyrophosphoramide	152-16-9	0.002		NA			160	--	--	--	0.07	--			
oryzalin	19044-88-3			NA			--	--	--	--	--	--			
oxadiazon	19666-30-9	0.005		NA			400	--	--	--	0.175	--			
oxamyl	23135-22-0			NA			--	--	--	--	--	--	0.2		
oxyfluorfen	42874-03-3			NA			--	--	--	--	--	--			
ozone	10028-15-6			NA			--	--	--	--	--	--			
paclobutrazol	76738-62-0			NA			--	--	--	--	--	--			
paraldehyde	123-63-7			NA			--	--	--	--	--	--			
paraquat	1910-42-5			NA			--	--	--	--	--	--			
parathion	56-38-2	0.006		C			480	--	--	--	0.21	--			
pebulate	1114-71-2	0.05		NA			4000	--	--	--	1.75	--			
pendimethalin	40487-42-1	0.04		NA			3200	--	--	--	1.4	--			
pentabromodiphenyl ether	32534-81-9	0.002		D			160	--	--	--	0.07	--			
pentachlorobenzene	608-93-5	0.0008		D			64	--	--	--	0.028	--			
pentachlorocyclopentadiene	25329-35-5			D			--	--	--	--	--	--			
pentachlorophenol	87-86-5	0.03		B2	0.12		2400	5.83333	--	--	1.05	0.00029	0.001	20	13
pentachloropropene, 1,1,2,3,3-	1600-37-9			NA			--	--	--	--	--	--			
pentane, n-	109-66-0			NA			--	--	--	--	--	--			
pentanone, 4-methyl-2-	108-10-1	0.05	0.08	NA			4000	--	80	--	1.75	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
perfluorobutane	355-25-9			NA			--	--	--	--	--	--			
perfluoroethane	354-33-6			NA			--	--	--	--	--	--			
perfluorohexane	355-42-0			NA			--	--	--	--	--	--			
permethrin	52645-53-1			NA			--	--	--	--	--	--			
phenanthrene	85-01-8			D			--	--	--	--	--	--			
phenmedipham	13684-63-4	0.2		NA			16000	--	--	--	7	--			
phenol	108-95-2	0.6		D			48000	--	--	--	21	--			
phenol, 2,3,4-trichloro	15950-66-0			NA			--	--	--	--	--	--			
phenol, 2,3,5-trichloro	933-78-8			NA			--	--	--	--	--	--			
phenol, 2,3,6-trichloro	933-75-5			NA			--	--	--	--	--	--			
phenol, 2,3-dimethyl	526-75-0			NA			--	--	--	--	--	--			
phenol, 2,3-dinitro	66-56-8			NA			--	--	--	--	--	--			
phenol, 2,4,5-trichloro	95-95-4	0.1		NA			8000	--	--	--	3.5	--			
phenol, 2,4,6-trichloro	88-06-2			B2	0.011	3.1E-06	--	63.6364	--	0.3226	--	0.00318			
phenol, 2,4-dimethyl	105-67-9	0.02		NA			1600	--	--	--	0.7	--			
phenol, 2,4-dinitro	51-28-5	0.002		NA			160	--	--	--	0.07	--			
phenol, 2,5-dimethyl	95-87-4			NA			--	--	--	--	--	--			
phenol, 2,5-dinitro	329-71-5			NA			--	--	--	--	--	--			
phenol, 2,6-dimethyl	576-26-1	0.0006		NA			48	--	--	--	0.021	--			
phenol, 2,6-dinitro	573-56-8			NA			--	--	--	--	--	--			
phenol, 2-chloro	95-57-8	0.005		NA			400	--	--	--	0.175	--			
phenol, 3,4,5-trichloro	609-19-8			NA			--	--	--	--	--	--			
phenol, 3,4-dimethyl	95-65-8	0.001		NA			80	--	--	--	0.035	--			
phenol, 3,5-dinitro	586-11-8			NA			--	--	--	--	--	--			
phenol, 3-chloro	108-43-0			NA			--	--	--	--	--	--			
phenol, 4,6-dinitro-o-cyclohexyl	131-89-5	0.002		NA			160	--	--	--	0.07	--			
phenol, 4-chloro	106-48-9			NA			--	--	--	--	--	--			
phenol, m-amino	591-27-5	0.07		NA			5600	--	--	--	2.45	--			
phenol, o-amino	95-55-6			NA			--	--	--	--	--	--			
phenol, p-amino	123-30-8			NA			--	--	--	--	--	--			
phenol, p-nitro	100-02-7			NA			--	--	--	--	--	--			
phenylenediamine, m-	108-45-2	0.006		NA			480	--	--	--	0.21	--			
phenylenediamine, o-	95-54-5			B2	0.047		--	14.8936	--	--	--	0.00074			
phenylenediamine, p-	106-50-3	0.19		NA			15200	--	--	--	6.65	--			
phenylmercuric acetate	62-38-4	8E-05		NA			6.4	--	--	--	0.0028	--			
phenylphenol, 2-	90-43-7			C	0.00194		--	3608.25	--	--	--	0.18041			
phorate	298-02-2	0.0002		NA			16	--	--	--	0.007	--			
phosalone	2310-17-0			NA			--	--	--	--	--	--			
phosgene	75-44-5			NA			--	--	--	--	--	--			
phosmet	732-11-6			NA			--	--	--	--	--	--			
phosphate, diethyl-p-nitrophenyl	311-45-5			D			--	--	--	--	--	--			
phosphine	7803-51-2	0.0003	3E-05	NA			24	--	0.03	--	0.0105	--			
phosphorus	7723-14-0	2E-05		D			1.6	--	--	--	0.0007	--			
phthalate, bis(2-ethylhexyl)	117-81-7	0.02		B2	0.014		1600	50	--	--	0.7	0.0025	0.006		
phthalate, di-n-butyl	84-74-2	0.1		D			8000	--	--	--	3.5	--			
phthalate, di-n-octyl-	117-84-0	0.02		NA			1600	--	--	--	0.7	--			
phthalate, dimethyl	131-11-3	10		D			800000	--	--	--	350	--			
phthalate, dimethyltere	120-61-6	0.1		NA			8000	--	--	--	3.5	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
phthalate, N-butylbenzyl	85-68-7	0.2		C			16000	--	--	--	7	--			
phthalic acid, m-	121-91-5			NA			--	--	--	--	--	--			
phthalic acid, o-	88-99-3			NA			--	--	--	--	--	--			
phthalic acid, p-	100-21-0	1		NA			80000	--	--	--	35	--			
phthalic anhydride	85-44-9	2	0.12	NA			160000	--	120	--	70	--			
picloram	1918-02-1	0.07		NA			5600	--	--	--	2.45	--	0.5		
pinene, alpha-	80-56-8			NA			--	--	--	--	--	--			
pinene, beta-	127-91-3			NA			--	--	--	--	--	--			
pirimiphos-methyl	29232-93-7	0.01		NA			800	--	--	--	0.35	--			
polybrominated biphenyls	NO CASRN	7E-06		NA			0.56	--	--	--	0.00025	--			
polychlorinated biphenyls (PCBs)	1336-36-3			B2	7.7		--	0.09091	--	--	--	4.5E-06	5E-04		0.014
polycyclic organic matter (POM)	NO CASRN			NA			--	--	--	--	--	--			
potassium bromate	7758-01-2			NA			--	--	--	--	--	--			
potassium cyanide	151-50-8	0.05		NA			4000	--	--	--	1.75	--			
potassium silver cyanide	506-61-6	0.2		NA			16000	--	--	--	7	--			
prochloraz	67747-09-5	0.009		C	0.15		720	46.6667	--	--	0.315	0.00233			
profluralin	26399-36-0	0.006		NA			480	--	--	--	0.21	--			
prometon	1610-18-0			NA			--	--	--	--	--	--			
prometryn	7287-19-6	0.004		NA			320	--	--	--	0.14	--			
pronamide	23950-58-5	0.075		NA			6000	--	--	--	2.625	--			
propachlor	1918-16-7	0.013		NA			1040	--	--	--	0.455	--			
propane, 2-chloro	75-29-6	0.1		NA			8000	--	--	--	3.5	--			
propane, 2-nitro	79-46-9		0.02	B2		0.0027	--	--	20	0.0004	--	--			
propanil	709-98-8			NA			--	--	--	--	--	--			
propargite	2312-35-8	0.02		NA			1600	--	--	--	0.7	--			
propargyl alcohol	107-19-7	0.002		NA			160	--	--	--	0.07	--			
propazine	139-40-2	0.02		NA			1600	--	--	--	0.7	--			
propham	122-42-9	0.02		NA			1600	--	--	--	0.7	--			
propiconazole	60207-90-1	0.013		NA			1040	--	--	--	0.455	--			
propiolactone, beta-	57-57-8			NA			--	--	--	--	--	--			
propionic acid, 2(2,4,5-trichlorophenoxy)	93-72-1	0.008		D			640	--	--	--	0.28	--	0.05		
propionic acid, 2-(2-methyl-4-chlorophenoxy)	93-65-2	0.001		NA			80	--	--	--	0.035	--			
propionitrile	107-12-0			NA			--	--	--	--	--	--			
propyl alcohol, n-	71-23-8			NA			--	--	--	--	--	--			
propylene glycol	57-55-6	20		NA			1600000	--	--	--	700	--			
propylene oxide	75-56-9		0.03	B2	0.24	3.7E-06	--	2.91667	30	0.2703	--	0.00015			
propyleneimine	75-55-8			NA			--	--	--	--	--	--			
pursuit	81335-77-5	0.25		NA			20000	--	--	--	8.75	--			
pydrin	51630-58-1			NA			--	--	--	--	--	--			
pyrene	129-00-0	0.03		D			2400	--	--	--	1.05	--			
pyridine	110-86-1	0.001		NA			80	--	--	--	0.035	--			
pyridine, 4-amino	504-24-5	2E-05		D			1.6	--	--	--	0.0007	--			
quinalphos	13593-03-8			NA			--	--	--	--	--	--			
quinoline	91-22-5			C	12		--	0.58333	--	--	--	2.9E-05			
quinone	106-51-4			NA			--	--	--	--	--	--			
radium 226,228	7440-14-4			NA			--	--	--	--	--	--			
radon 222	14859-67-7			NA			--	--	--	--	--	--			
rdx	121-82-4	0.003		C	0.11		240	63.6364	--	--	0.105	0.00318			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
refractory ceramic fibers	NO CASRN			B2			--	--	--	--	--	--			
resmethrin	10453-86-8	0.03		NA			2400	--	--	--	1.05	--			
ronnel	299-84-3	0.05		NA			4000	--	--	--	1.75	--			
rotenone	83-79-4	0.004		NA			320	--	--	--	0.14	--			
savey	78587-05-0	0.025		NA			2000	--	--	--	0.875	--			
selenious acid	7783-00-8	0.005		D			400	--	--	--	0.175	--			
selenium	7782-49-2	0.005		D			400	--	--	--	0.175	--	0.05	20	5
selenium sulfide	7446-34-6			B2			--	--	--	--	--	--			
selenourea	630-10-4	0.005		NA			400	--	--	--	0.175	--			
sethoxydim	74051-80-2	0.09		NA			7200	--	--	--	3.15	--			
silver	7440-22-4	0.005		D			400	--	--	--	0.175	--		4.1	
silver cyanide	506-64-9	0.1		NA			8000	--	--	--	3.5	--			
simazine	122-34-9	0.005		C	0.12		400	58.3333	--	--	0.175	0.00292	0.004		
sodium azide	26628-22-8	0.004		NA			320	--	--	--	0.14	--			
sodium cyanide	143-33-9	0.04		NA			3200	--	--	--	1.4	--			
sodium diethyldithiocarbamate	148-18-5	0.03		C	0.27		2400	25.9259	--	--	1.05	0.0013			
sodium fluoroacetate	62-74-8			NA			--	--	--	--	--	--			
sodium metavanadate	13718-26-8	0.001		NA			80	--	--	--	0.035	--			
strontium	7440-24-6	0.6		NA			48000	--	--	--	21	--			
strychnine	57-24-9	0.0003		NA			24	--	--	--	0.0105	--			
styrene	100-42-5	0.2	1	NA			16000	--	1000	--	7	--	0.1		
succinonitrile	110-61-2			NA			--	--	--	--	--	--			
sulfate, dimethyl	77-78-1			B2			--	--	--	--	--	--			
sulfide, p-chlorophenyl methyl	123-09-1			D			--	--	--	--	--	--			
sulfone, p-chlorophenyl methyl	98-57-7			D			--	--	--	--	--	--			
sulfoxide, p-chlorophenyl methyl	934-73-6			D			--	--	--	--	--	--			
sulfuric acid	7664-93-9		0.07	NA			--	--	70	--	--	--			
systhane	88761-89-0	0.025		NA			2000	--	--	--	0.875	--			
tebuthiuron	34014-18-1	0.07		NA			5600	--	--	--	2.45	--			
temephos	3383-96-8	0.02		NA			1600	--	--	--	0.7	--			
terbacil	5902-51-2			NA			--	--	--	--	--	--			
terbufos	13071-79-9	3E-05		NA			2	--	--	--	0.00088	--			
terbutryn	886-50-0	0.001		NA			80	--	--	--	0.035	--			
tetrabromodiphenyl ether	40088-47-9			D			--	--	--	--	--	--			
tetrachloroazoxybenzene	21232-47-3			NA			--	--	--	--	--	--			
tetrachlorobenzene, 1,2,4,5-	95-94-3	0.0003		NA			24	--	--	--	0.0105	--			
tetrachlorocyclopentadiene	695-77-2			D			--	--	--	--	--	--			
tetrachloroethane, 1,1,1,2-	630-20-6	0.03		C	0.026	7.4E-06	2400	269.231	--	1.3514	1.05	0.01346			
tetrachloroethane, 1,1,2,2-	79-34-5			C	0.2	0.000058	--	35	--	0.1724	--	0.00175			
tetrachloroethene	127-18-4	0.01		C-B2	0.052	5.8E-07	800	134.615	--	17.241	0.35	0.00673	0.005		
tetrachlorohydrazobenzene	71753-42-9			NA			--	--	--	--	--	--			
tetrachlorophenol, 2,3,4,5-	4901-51-3			NA			--	--	--	--	--	--			
tetrachlorophenol, 2,3,4,6-	58-90-2	0.03		NA			2400	--	--	--	1.05	--			
tetrachlorophenol, 2,3,5,6-	935-95-5			NA			--	--	--	--	--	--			
tetrachloropropene, 1,1,2,3-	10436-39-2			NA			--	--	--	--	--	--			
tetrachlorotoluene, p-, a,a,a-	5216-25-1			B2	20		--	0.035	--	--	--	1.8E-06			
tetrachlorvinphos	961-11-5	0.03		C	0.024		2400	291.667	--	--	1.05	0.01458			
tetraethyl dithiopyrophosphate	3689-24-5	0.0005		NA			40	--	--	--	0.0175	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
tetraethyl lead	78-00-2			NA			--	--	--	--	--	--			
thallic oxide	1314-32-5	7E-05		D			5.6	--	--	--	0.00245	--	0.002		
thallium	7440-28-0			NA			--	--	--	--	--	--	0.002		
thallium (I) acetate	563-68-8	9E-05		D			7.2	--	--	--	0.00315	--	0.002		
thallium (I) carbonate	6533-73-9	8E-05		D			6.4	--	--	--	0.0028	--	0.002		
thallium (I) chloride	7791-12-0	8E-05		D			6.4	--	--	--	0.0028	--	0.002		
thallium (I) nitrate	10102-45-1	9E-05		D			7.2	--	--	--	0.00315	--	0.002		
thallium (I) sulfate	7446-18-6	8E-05		D			6.4	--	--	--	0.0028	--	0.002		
thallium selenite	12039-52-0	9E-05		D			7.2	--	--	--	0.00315	--	0.002		
thiobencarb	28249-77-6	0.01		NA			800	--	--	--	0.35	--			
thiofanox	39196-18-4	0.0003		NA			24	--	--	--	0.0105	--			
thiophanate-methyl	23564-05-8			NA			--	--	--	--	--	--			
thiram	137-26-8	0.005		NA			400	--	--	--	0.175	--			
tin	7440-31-5	0.6		NA			48000	--	--	--	21	--			
toluene	108-88-3	0.2	0.4	D			16000	--	400	--	7	--	1		
toluene diisocyanate, 2,4-	NO CAS RN			NA			--	--	--	--	--	--			
toluene, 2,3-diamino	2687-25-4			NA			--	--	--	--	--	--			
toluene, 2,3-dinitro	602-01-7			NA			--	--	--	--	--	--			
toluene, 2,4,6-trinitro	118-96-7	0.0005		C	0.03		40	233.333	--	--	0.0175	0.01167			
toluene, 2,4-diamino	95-80-7			B2	3.2		--	0.21875	--	--	--	1.1E-05			
toluene, 2,4-dinitro	121-14-2	0.002		B2	0.68		160	1.02941	--	--	0.07	5.1E-05			
toluene, 2,5-diamino	95-70-5	0.6		NA			48000	--	--	--	21	--			
toluene, 2,5-dinitro	619-15-8			NA			--	--	--	--	--	--			
toluene, 2,6-diamino	823-40-5	0.2		NA			16000	--	--	--	7	--			
toluene, 2,6-dinitro	606-20-2	0.001		B2	0.68		80	1.02941	--	--	0.035	5.1E-05			
toluene, 3,4-diamino	496-72-0			NA			--	--	--	--	--	--			
toluene, 3,4-dinitro	610-39-9			NA			--	--	--	--	--	--			
toluene, m-chloro	108-41-8			NA			--	--	--	--	--	--			
toluene, m-ethyl	620-14-4			NA			--	--	--	--	--	--			
toluene, o-chloro	95-49-8	0.02		NA			1600	--	--	--	0.7	--			
toluene, o-ethyl	611-14-3			NA			--	--	--	--	--	--			
toluene, p-chloro	106-43-4			NA			--	--	--	--	--	--			
toluene, p-ethyl	622-96-8			NA			--	--	--	--	--	--			
toluidine, m-	108-44-1			NA			--	--	--	--	--	--			
toluidine, p-	106-49-0			C	0.19		--	36.8421	--	--	--	0.00184			
toxaphene	8001-35-2			B2	1.1	0.00032	--	0.63636	--	0.0031	--	3.2E-05	0.003	0.73	0.0002
tralomethrin	66841-25-6	0.0075		NA			600	--	--	--	0.2625	--			
triallate	2303-17-5	0.013		NA			1040	--	--	--	0.455	--			
triasulfuron	82097-50-5	0.01		NA			800	--	--	--	0.35	--			
tribromochloromethane	594-15-0			D			--	--	--	--	--	--			
tribromodiphenyl ether	49690-94-0			D			--	--	--	--	--	--			
tributyltin oxide	56-35-9	3E-05		NA			2.4	--	--	--	0.00105	--			
trichlorocyclopentadiene	77323-84-3			D			--	--	--	--	--	--			
trichloroethene	79-01-6			NA			--	--	--	--	--	--	0.005		
trichlorofluoromethane	75-69-4	0.3	0.7	NA			24000	--	700	--	10.5	--			
trichloropropane, 1,1,1-	7789-89-1			NA			--	--	--	--	--	--			
trichloropropane, 1,1,2-	598-77-6	0.005		NA			400	--	--	--	0.175	--			
trichloropropane, 1,2,2-	3175-23-3			NA			--	--	--	--	--	--			

Sub Part S Action Levels - April 15, 1994		Oral	Inh		Oral	Inh.	Soil Action Levels		Air Action Level		Water Action Level			AWQC - FW	
		RfD	RfC	Wt. of	SF	Unit Risk	non carc.	carc.	non car	carc.	non carc.	carc.	MCL	Acute	Chronic
Chemical	CAS #	mg/kg-d	mg/m3	Evid.	(mg/kg-d)-1	(ug/m3)-1	mg/kg	mg/kg	ug/m3	ug/m3	mg/L	mg/L	mg/L	ug/L	ug/L
trichloropropane, 1,2,3-	96-18-4	0.006		B2			480	--	--	--	0.21	--			
trichloropropene, 1,2,3-	96-19-5	0.005		NA			400	--	--	--	0.175	--			
trichlorotoluene, 2,3,6-	2077-46-5			NA			--	--	--	--	--	--			
trichlorotoluene, alpha,2,6-	2014-83-7			NA			--	--	--	--	--	--			
tricresol	1319-77-3			NA			--	--	--	--	--	--			
tridiphane	58138-08-2			NA			--	--	--	--	--	--			
triethylamine	121-44-8		0.007	NA			--	--	7	--	--	--			
trifluoroethane, 1,1,1-	420-46-2			NA			--	--	--	--	--	--			
trifluoromethane	75-46-7			NA			--	--	--	--	--	--			
trifluralin	1582-09-8	0.0075		C	0.0077		600	909.091	--	--	0.2625	0.04545			
trimethyl phosphate	512-56-1			B2	0.037		--	18.9189	--	--	--	0.00095			
trimethylpentane, 2,2,4-	540-84-1			NA			--	--	--	--	--	--			
trinitrophenylmethylnitramine	479-45-8	0.01		NA			800	--	--	--	0.35	--			
uranium, natural	7440-61-1			NA			--	--	--	--	--	--			
uranium, soluble salts	NO CASRN	0.003		NA			240	--	--	--	0.105	--			
urea, n,n-dimethyl	598-94-7			NA			--	--	--	--	--	--			
vanadium	7440-62-2	0.007		NA			560	--	--	--	0.245	--			
vanadium pentoxide	1314-62-1	0.009		NA			720	--	--	--	0.315	--			
vanadium sulfate	36907-42-3	0.02		NA			1600	--	--	--	0.7	--			
vernam	1929-77-7	0.001		NA			80	--	--	--	0.035	--			
vinclozolin	50471-44-8			NA			--	--	--	--	--	--			
vinyl acetate	108-05-4	1	0.2	NA			80000	--	200	--	35	--			
vinyl bromide	593-60-2		0.003	B2		0.000032	--	--	3	0.0313	--	--			
vinyl chloride	75-01-4			A	1.9	0.000084	--	0.36842	--	0.0119	--	1.8E-05	0.002		
warfarin	81-81-2	0.0003		NA			24	--	--	--	0.0105	--			
xylene, 4-ethyl-o-	934-80-5			NA			--	--	--	--	--	--			
xylene, m-	108-30-3	2		NA			160000	--	--	--	70	--	10		
xylene, mixture	1330-20-7	2		D			160000	--	--	--	70	--	10		
xylene, o-	95-47-6	2		NA			160000	--	--	--	70	--	10		
xylene, p-	106-42-3			NA			--	--	--	--	--	--	10		
zinc	7440-66-6	0.3		D			24000	--	--	--	10.5	--		120	110
zinc cyanide	557-21-1	0.05		NA			4000	--	--	--	1.75	--			
zinc phosphide	1314-84-7	0.0003		NA			24	--	--	--	0.0105	--			
zineb	12122-67-7	0.05		NA			4000	--	--	--	1.75	--			

Attachment B

EPA Region III RBCs

Sources: i=IRIS h=HEAST a=HEAST alt. w=Withdrawn from IRIS or HEAST e=EPA-ECAO provisional o=Other EPA documents

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Tap water µg/L	Ambient air µg/m3	Fish mg/kg	Industrial soil mg/kg	Residential soil mg/kg
Acephate	30560191	4.00E-03 i		8.70E-03 i			7.7 c	0.72 c	0.36 c	330 c	73 c
Acetaldehyde	75070		2.57E-03 i		7.70E-03 i		94 n	0.81 c			
Acetochlor	34256821	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Acetone	67641	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Acetone cyanohydrin	75865	7.00E-02 h	2.86E-03 a				2600 n	10 n	95 n	72000 n	5500 n
Acetonitrile	75078	6.00E-03 i	1.43E-02 a				220 n	52 n	8.1 n	6100 n	470 n
Acetophenone	98862	1.00E-01 i	5.71E-06 w			•••	0.042 n	0.021 n	140 n	100000 n	7800 n
Acifluorfen	62476599	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Acrolein	107028	2.00E-02 h	5.71E-06 i				730 n	0.021 n	27 n	20000 n	1600 n
Acrylamide	79061	2.00E-04 i		4.50E+00 i	4.55E+00 i		0.015 c	0.0014 c	0.0007 c	0.64 c	0.14 c
Acrylic acid	79107	5.00E-01 i	1.00E-03 i				18000 n	3.7 n	680 n	510000 n	39000 n
Acrylonitrile	107131	1.00E-03 h	5.71E-04 i	5.40E-01 i	2.38E-01 i		0.12 c	0.026 c	0.0058 c	5.3 c	1.2 c
Alachlor	15972608	1.00E-02 i		8.00E-02 h			0.84 c	0.078 c	0.039 c	36 c	8 c
Alar	1596845	1.50E-01 i					5500 n	550 n	200 n	150000 n	12000 n
Aldicarb	116063	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Aldicarb sulfone	1646884	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Aldrin	309002	3.00E-05 i		1.70E+01 i	1.71E+01 i		0.004 c	0.00037 c	0.00019 c	0.17 c	0.038 c
Ally	74223646	2.50E-01 i					9100 n	910 n	340 n	260000 n	20000 n
Allyl alcohol	107186	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Allyl chloride	107051	5.00E-02 w	2.86E-04 i				1800 n	1 n	68 n	51000 n	3900 n
Aluminum	7429905	1.00E+00 e					37000 n	3700 n	1400 n	1000000 n	78000 n
Aluminum phosphide	20859738	4.00E-04 i					15 n	1.5 n	0.54 n	410 n	31 n
Amdro	67485294	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Ametryn	834128	9.00E-03 i					330 n	33 n	12 n	9200 n	700 n
m-Aminophenol	591275	7.00E-02 h					2600 n	260 n	95 n	72000 n	5500 n
4-Aminopyridine	504245	2.00E-05 h					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Amitraz	33089611	2.50E-03 i					91 n	9.1 n	3.4 n	2600 n	200 n
Ammonia	7664417		2.86E-02 i				1000 n	100 n			
Ammonium sulfamate	7773060	2.00E-01 i					7300 n	730 n	270 n	200000 n	16000 n
Aniline	62533		2.86E-04 i	5.70E-03 i			10 n	1 n	0.55 c	500 c	110 c
Antimony and compounds	7440360	4.00E-04 i					15 n	1.5 n	0.54 n	410 n	31 n
Antimony pentoxide	1314609	5.00E-04 h					18 n	1.8 n	0.68 n	510 n	39 n
Antimony potassium tartrate	304610	9.00E-04 h					33 n	3.3 n	1.2 n	920 n	70 n
Antimony tetroxide	1332316	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
Antimony trioxide	1309644	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
Apollo	74115245	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Aramite	140578	5.00E-02 h		2.50E-02 i	2.49E-02 i		2.7 c	0.25 c	0.13 c	110 c	26 c
Arsenic	7440382	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Arsenic (as carcinogen)	7440382			1.75E+00 i	1.51E+01 i		0.038 c	0.00041 c	0.0018 c	1.6 c	0.37 c
Arsine	7784421		1.43E-05 i				0.52 n	0.052 n			
Assure	76578148	9.00E-03 i					330 n	33 n	12 n	9200 n	700 n
Asulam	3337711	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n

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Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Tap water µg/L	Ambient air µg/m3	Fish mg/kg	Industrial soil mg/kg	Residential soil mg/kg
Atrazine	1912249	3.50E-02 I		2.22E-01 h			0.3 c	0.028 c	0.014 c	13 c	2.9 c
Avermectin B1	65195553	4.00E-04 I					15 n	1.5 n	0.54 n	410 n	31 n
Azobenzene	103333			1.10E-01 I	1.08E-01 I		0.61 c	0.058 c	0.029 c	26 c	5.8 c
Barium and compounds	7440393	7.00E-02 I	1.43E-04 a				2600 n	0.52 n	95 n	72000 n	5500 n
Baygon	114261	4.00E-03 I					150 n	15 n	5.4 n	4100 n	310 n
Bayleton	43121433	3.00E-02 I					1100 n	110 n	41 n	31000 n	2300 n
Baythroid	68359375	2.50E-02 I					910 n	91 n	34 n	26000 n	2000 n
Benefin	1861401	3.00E-01 I					11000 n	1100 n	410 n	310000 n	23000 n
Benomyl	17804352	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Bentazon	25057890	2.50E-03 I					91 n	9.1 n	3.4 n	2600 n	200 n
Benzaldehyde	100527	1.00E-01 I				***	610 n	370 n	140 n	100000 n	7800 n
Benzene	71432		1.71E-03 e	2.90E-02 I	2.90E-02 I	***	0.36 c	0.22 c	0.11 c	99 c	22 c
Benzenethiol	108985	1.00E-05 h					0.37 n	0.037 n	0.014 n	10 n	0.78 n
Benzidine	92875	3.00E-03 I		2.30E+02 I	2.35E+02 I		0.00029 c	0.000027 c	0.000014 c	0.012 c	0.0028 c
Benzoic acid	65850	4.00E+00 I					150000 n	15000 n	5400 n	1000000 n	310000 n
Benzotrichloride	98077			1.30E+01 I			0.0052 c	0.00048 c	0.00024 c	0.22 c	0.049 c
Benzyl alcohol	100516	3.00E-01 h					11000 n	1100 n	410 n	310000 n	23000 n
Benzyl chloride	100447			1.70E-01 I		***	0.062 c	0.037 c	0.019 c	17 c	3.8 c
Beryllium and compounds	7440417	5.00E-03 I		4.30E+00 I	8.40E+00 I		0.016 c	0.00075 c	0.00073 c	0.67 c	0.15 c
Bidrin	141662	1.00E-04 I					3.7 n	0.37 n	0.14 n	100 n	7.8 n
Biphenthrin (Talstar)	82657043	1.50E-02 I					550 n	55 n	20 n	15000 n	1200 n
1,1-Biphenyl	92524	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Bis(2-chloroisopropyl)ether	39638329	4.00E-02 I		7.00E-02 h	3.50E-02 h	***	0.26 c	0.18 c	0.045 c	41 c	9.1 c
Bis(chloromethyl)ether	542881			2.20E+02 I	2.17E+02 I	***	0.000049 c	0.000029 c	0.000014 c	0.013 c	0.0029 c
Bis(2-chloro-1-methylethyl)ether				7.00E-02 w	7.00E-02 w		0.96 c	0.089 c	0.045 c	41 c	9.1 c
Bis(2-ethylhexyl)phthalate (DEHP)	117817	2.00E-02 I		1.40E-02 I			4.8 c	0.45 c	0.23 c	200 c	46 c
Bis(chloroethyl)ether	111444			1.10E+00 I	1.16E+00 I	***	0.0092 c	0.0054 c	0.0029 c	2.6 c	0.58 c
Bisphenol A	80057	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Boron (and borates)	7440428	9.00E-02 I	5.71E-03 h				3300 n	21 n	120 n	92000 n	7000 n
Boron trifluoride	7637072		2.00E-04 h				7.3 n	0.73 n			
Bromodichloromethane	75274	2.00E-02 I		6.20E-02 I		***	0.17 c	0.1 c	0.051 c	46 c	10 c
Bromoethene	593602				1.10E-01 h	***	0.096 c	0.057 c			
Bromoform (tribromomethane)	75252	2.00E-02 I		7.90E-03 I	3.85E-03 I	***	2.4 c	1.6 c	0.4 c	360 c	81 c
Bromomethane	74839	1.40E-03 I	1.43E-03 I			***	8.7 n	5.2 n	1.9 n	1400 n	110 n
4-Bromophenyl phenyl ether	101553	5.80E-02 o					2100 n	210 n	78 n	59000 n	4500 n
Bromophos	2104963	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Bromoxynil	1689845	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
Bromoxynil octanoate	1689992	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
1,3-Butadiene	106990				9.80E-01 I	***	0.011 c	0.0064 c			
1-Butanol	71363	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n
Butyl benzyl phthalate	85687	2.00E-01 I					7300 n	730 n	270 n	200000 n	16000 n
Butylate	2008415	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n

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Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

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sec-Butylbenzene	135988	1.00E-02 e				•••	61 n	37 n	14 n	10000 n	780 n
tert-Butylbenzene	104518	1.00E-02 e				•••	61 n	37 n	14 n	10000 n	780 n
Butylphthalyl butylglycolate	85701	1.00E+00 i					37000 n	3700 n	1400 n	1000000 n	78000 n
Cacodylic acid	75605	3.00E-03 h					110 n	11 n	4.1 n	3100 n	230 n
Cadmium and compounds	7440439	5.00E-04 i			6.30E+00 i		18 n	0.00099 c	0.68 n	510 n	39 n
Caprolactam	105602	5.00E-01 i					18000 n	1800 n	680 n	510000 n	39000 n
Captafol	2425061	2.00E-03 i		8.60E-03 h			7.8 c	0.73 c	0.37 c	330 c	74 c
Captan	133062	1.30E-01 i		3.50E-03 h			19 c	1.8 c	0.9 c	820 c	180 c
Carbaryl	63252	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Carbazole	86748			2.00E-02 h			3.4 c	0.31 c	0.16 c	140 c	32 c
Carbofuran	1563662	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Carbon disulfide	75150	1.00E-01 i	2.86E-03 h			•••	21 n	10 n	140 n	100000 n	7800 n
Carbon tetrachloride	56235	7.00E-04 i	5.71E-04 e	1.30E-01 i	5.25E-02 i	•••	0.16 c	0.12 c	0.024 c	22 c	4.9 c
Carbosulfan	55285148	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
Carboxin	5234684	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Chloral	75876	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Chloramben	133904	1.50E-02 i					550 n	55 n	20 n	15000 n	1200 n
Chloranil	118752			4.03E-01 h			0.17 c	0.016 c	0.0078 c	7.1 c	1.6 c
Chlordane	57749	6.00E-05 i		1.30E+00 i	1.29E+00 i		0.052 c	0.0049 c	0.0024 c	2.2 c	0.49 c
Chlorimuron-ethyl	90982324	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Chlorine	7782505	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Chlorine dioxide	10049044		5.71E-05 i				2.1 n	0.21 n			
Chloroacetaldehyde	107200	6.90E-03 o					250 n	25 n	9.3 n	7100 n	540 n
Chloroacetic acid	79118	2.00E-03 h					73 n	7.3 n	2.7 n	2000 n	160 n
2-Chloroacetophenone	532274		8.57E-06 i				0.31 n	0.031 n			
4-Chloroaniline	106478	4.00E-03 i					150 n	15 n	5.4 n	4100 n	310 n
Chlorobenzene	108907	2.00E-02 i	5.71E-03 e			•••	39 n	21 n	27 n	20000 n	1600 n
Chlorobenzilate	510156	2.00E-02 i		2.70E-01 h	2.70E-01 h		0.25 c	0.023 c	0.012 c	11 c	2.4 c
p-Chlorobenzoic acid	74113	2.00E-01 h					7300 n	730 n	270 n	200000 n	16000 n
4-Chlorobenzotrifluoride	98566	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
2-Chloro-1,3-butadiene	126998	2.00E-02 a	2.00E-03 h			•••	14 n	7.3 n	27 n	20000 n	1600 n
1-Chlorobutane	109693	4.00E-01 h				•••	2400 n	1500 n	540 n	410000 n	31000 n
Chlorodifluoromethane	75456		1.43E+01 i			•••	87000 n	52000 n			
Chloroethane	75003	4.00E-01 e	2.86E+00 i			•••	8600 n	10000 n	540 n	410000 n	31000 n
2-Chloroethyl vinyl ether	110758	2.50E-02 o				•••	150 n	91 n	34 n	26000 n	2000 n
Chloroform	67663	1.00E-02 i		6.10E-03 i	8.05E-02 i	•••	0.15 c	0.078 c	0.52 c	470 c	100 c
Chloromethane	74873			1.30E-02 h	6.30E-03 h	•••	1.4 c	0.99 c	0.24 c	220 c	49 c
4-Chloro-2,2-methylaniline hydrochloride	3165933			4.60E-01 h			0.15 c	0.014 c	0.0069 c	6.2 c	1.4 c
4-Chloro-2-methylaniline	95692			5.80E-01 h			0.12 c	0.011 c	0.0054 c	4.9 c	1.1 c
beta-Chloronaphthalene	91587	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
o-Chloronitrobenzene	88733			2.50E-02 h		•••	0.42 c	0.25 c	0.13 c	110 c	26 c
p-Chloronitrobenzene	100005			1.80E-02 h		•••	0.59 c	0.35 c	0.18 c	160 c	35 c

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Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Tap water µg/L	Ambient air µg/m3	Fish mg/kg	Industrial soil mg/kg	Residential soil mg/kg
2-Chlorophenol	95578	5.00E-03 I					180 n	18 n	6.8 n	5100 n	390 n
2-Chloropropane	75296		2.86E-02 h			•••	170 n	100 n			
Chlorothalonil	1897456	1.50E-02 I		1.10E-02 h			6.1 c	0.57 c	0.29 c	260 c	58 c
o-Chlorotoluene	95498	2.00E-02 I				•••	120 n	73 n	27 n	20000 n	1600 n
Chlorpropham	101213	2.00E-01 I					7300 n	730 n	270 n	200000 n	16000 n
Chlorpyrifos	2921882	3.00E-03 I					110 n	11 n	4.1 n	3100 n	230 n
Chlorpyrifos-methyl	5598130	1.00E-02 h					370 n	37 n	14 n	10000 n	780 n
Chlorsulfuron	64902723	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Chlorthiophos	60238564	8.00E-04 h					29 n	2.9 n	1.1 n	820 n	63 n
Chromium III and compounds	16065831	1.00E+00 I	5.71E-07 w				37000 n	0.0021 n	1400 n	1000000 n	78000 n
Chromium VI and compounds	7440473	5.00E-03 I			4.20E+01 I		180 n	0.00015 c	6.8 n	5100 n	390 n
Coal tar	8001589				2.20E+00 w			0.0028 c			
Cobalt	7440484	6.00E-02 e					2200 n	220 n	81 n	61000 n	4700 n
Coke Oven Emissions	8007452				2.17E+00 I			0.0029 c			
Copper and compounds	7440508	3.71E-02 h					1400 n	140 n	50 n	38000 n	2900 n
Crotonaldehyde	123739	1.00E-02 w		1.90E+00 h	1.90E+00 w		0.035 c	0.0033 c	0.0017 c	1.5 c	0.34 c
Cumene	98828	4.00E-02 I	2.57E-03 h				1500 n	9.4 n	54 n	41000 n	3100 n
Cyanides:											
Barium cyanide	542621	1.00E-01 w					3700 n	370 n	140 n	100000 n	7800 n
Calcium cyanide	592018	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
Copper cyanide	544923	5.00E-03 I					180 n	18 n	6.8 n	5100 n	390 n
Cyanazine	21725462	2.00E-03 h		8.40E-01 h			0.08 c	0.0075 c	0.0038 c	3.4 c	0.76 c
Cyanogen	460195	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
Cyanogen bromide	506683	9.00E-02 I					3300 n	330 n	120 n	92000 n	7000 n
Cyanogen chloride	506774	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Free cyanide	57125	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
Hydrogen cyanide	74908	2.00E-02 I	8.57E-04 I				730 n	3.1 n	27 n	20000 n	1600 n
Potassium cyanide	151508	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Potassium silver cyanide	506616	2.00E-01 I					7300 n	730 n	270 n	200000 n	16000 n
Silver cyanide	506649	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n
Sodium cyanide	143339	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
Zinc cyanide	557211	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Cyclohexanone	108941	5.00E+00 I				•••	30000 n	18000 n	6800 n	1000000 n	390000 n
Cyclohexlamine	108918	2.00E-01 I					7300 n	730 n	270 n	200000 n	16000 n
Cyhalothrin/Karate	68085858	5.00E-03 I					180 n	18 n	6.8 n	5100 n	390 n
Cypermethrin	52315078	1.00E-02 I					370 n	37 n	14 n	10000 n	780 n
Cyromazine	66215278	7.50E-03 I					270 n	27 n	10 n	7700 n	590 n
Dacthal	1861321	1.00E-02 I					370 n	37 n	14 n	10000 n	780 n
Dalapon	75990	3.00E-02 I					1100 n	110 n	41 n	31000 n	2300 n
Danitol	39515418	2.50E-02 I					910 n	91 n	34 n	26000 n	2000 n
DDD	72548			2.40E-01 I			0.28 c	0.026 c	0.013 c	12 c	2.7 c
DDE	72559			3.40E-01 I			0.2 c	0.018 c	0.0093 c	8.4 c	1.9 c

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DDT	50293	5.00E-04 i		3.40E-01 i	3.40E-01 i		0.2 c	0.018 c	0.0093 c	8.4 c	1.9 c
Decabromodiphenyl ether	1163195	1.00E-02 i				***	61 n	37 n	14 n	10000 n	780 n
Demeton	8065483	4.00E-05 i					1.5 n	0.15 n	0.054 n	41 n	3.1 n
Diallate	2303164			6.10E-02 h		***	0.17 c	0.1 c	0.052 c	47 c	10 c
Diazinon	333415	9.00E-04 h					33 n	3.3 n	1.2 n	920 n	70 n
Dibenzofuran	132649	4.00E-03 e					150 n	15 n	5.4 n	4100 n	310 n
1,4-Dibromobenzene	106376	1.00E-02 i				***	61 n	37 n	14 n	10000 n	780 n
Dibromochloromethane	124481	2.00E-02 i		8.40E-02 i		***	0.13 c	0.075 c	0.038 c	34 c	7.6 c
1,2-Dibromo-3-chloropropane	96128		5.71E-05 i	1.40E+00 h	2.42E-03 h	***	0.048 c	0.21 n	0.0023 c	2 c	0.46 c
1,2-Dibromoethane	106934		5.71E-05 h	8.50E+01 i	7.70E-01 i	***	0.00075 c	0.0081 c	0.000037 c	0.034 c	0.0075 c
Dibutyl phthalate	84742	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Dicamba	1918009	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
1,2-Dichlorobenzene	95501	9.00E-02 i	5.71E-02 e			***	370 n	210 n	120 n	92000 n	7000 n
1,3-Dichlorobenzene	541731	8.90E-02 o				***	540 n	320 n	120 n	91000 n	7000 n
1,4-Dichlorobenzene	106467		2.29E-01 i	2.40E-02 h		***	0.44 c	0.26 c	0.13 c	120 c	27 c
3,3'-Dichlorobenzidine	91941			4.50E-01 i			0.15 c	0.014 c	0.007 c	6.4 c	1.4 c
1,4-Dichloro-2-butene	764410				9.30E+00 h	***	0.0011 c	0.00067 c			
Dichlorodifluoromethane	75718	2.00E-01 i	5.71E-02 e			***	390 n	210 n	270 n	200000 n	16000 n
1,1-Dichloroethane	75343	1.00E-01 h	1.43E-01 e			***	810 n	520 n	140 n	100000 n	7800 n
1,2-Dichloroethane (EDC)	107062		2.86E-03 e	9.10E-02 i	9.10E-02 i	***	0.12 c	0.069 c	0.035 c	31 c	7 c
1,1-Dichloroethylene	75354	9.00E-03 i		6.00E-01 i	1.75E-01 i	***	0.044 c	0.036 c	0.0053 c	4.8 c	1.1 c
1,2-Dichloroethylene (cis)	156592	1.00E-02 h				***	61 n	37 n	14 n	10000 n	780 n
1,2-Dichloroethylene (trans)	156605	2.00E-02 i				***	120 n	73 n	27 n	20000 n	1600 n
1,2-Dichloroethylene (mixture)	540590	9.00E-03 h				***	55 n	33 n	12 n	9200 n	700 n
2,4-Dichlorophenol	120832	3.00E-03 i					110 n	11 n	4.1 n	3100 n	230 n
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94757	1.00E-02 i				***	61 n	37 n	14 n	10000 n	780 n
4-(2,4-Dichlorophenoxy)butyric Acid	94826	8.00E-03 i					290 n	29 n	11 n	8200 n	630 n
1,2-Dichloropropane	78875		1.14E-03 i	6.80E-02 h		***	0.16 c	0.092 c	0.046 c	42 c	9.4 c
2,3-Dichloropropanol	616239	3.00E-03 i					110 n	11 n	4.1 n	3100 n	230 n
1,3-Dichloropropene	542756	3.00E-04 i	5.71E-03 i	1.75E-01 h	1.30E-01 h	***	0.077 c	0.048 c	0.018 c	16 c	3.7 c
Dichlorvos	62737	5.00E-04 i	1.43E-04 i	2.90E-01 i			0.23 c	0.022 c	0.011 c	9.9 c	2.2 c
Dicofol	115322			4.40E-01 w			0.15 c	0.014 c	0.0072 c	6.5 c	1.5 c
Dicyclopentadiene	77736	3.00E-02 h	5.71E-05 e			***	0.42 n	0.21 n	41 n	31000 n	2300 n
Dieldrin	60571	5.00E-05 i		1.60E+01 i	1.61E+01 i		0.0042 c	0.00039 c	0.0002 c	0.18 c	0.04 c
Diesel emissions			1.43E-03 i				52 n	5.2 n			
Diethyl phthalate	84662	8.00E-01 i					29000 n	2900 n	1100 n	820000 n	63000 n
Diethylene glycol, monobutyl ether	112345		5.71E-03 h				210 n	21 n			
Diethylene glycol, monoethyl ether	111900	2.00E+00 h					73000 n	7300 n	2700 n	1000000 n	160000 n
Diethylformamide	617845	1.10E-02 h					400 n	40 n	15 n	11000 n	860 n
Di(2-ethylhexyl)adipate	103231	6.00E-01 i		1.20E-03 i			56 c	5.2 c	2.6 c	2400 c	530 c
Diethylstilbestrol	56531			4.70E+03 h			0.000014 c	1.30E-06 c	6.70E-07 c	0.00061 c	0.00014 c
Difenzoquat (Avenge)	43222486	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n

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Diflubenzuron	35367385	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
1,1-Difluoroethane	**75376**		**1.14E+01 I**			***	**69000 n**	**42000 n**			
Diisopropyl methylphosphonate (DIMP)	1445756	8.00E-02 I					2900 n	290 n	110 n	82000 n	6300 n
Dimethipin	55290647	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
Dimethoate	60515	2.00E-04 I					7.3 n	0.73 n	0.27 n	200 n	16 n
3,3'-Dimethoxybenzidine	119904			1.40E-02 h			4.8 c	0.45 c	0.23 c	200 c	46 c
Dimethyl phthalate	131113	1.00E+01 h					370000 n	37000 n	14000 n	1000000 n	780000 n
Dimethyl terephthalate	120616	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n
Dimethylamine	124403		5.71E-06 w				0.21 n	0.021 n			
2,4-Dimethylaniline hydrochloride	21436964			5.80E-01 h			0.12 c	0.011 c	0.0054 c	4.9 c	1.1 c
2,4-Dimethylaniline	95681			7.50E-01 h			0.09 c	0.0083 c	0.0042 c	3.8 c	0.85 c
N-N-Dimethylaniline	121697	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
3,3'-Dimethylbenzidine	119937			9.20E+00 h			0.0073 c	0.00068 c	0.00034 c	0.31 c	0.069 c
N,N-Dimethylformamide	68122	1.00E-01 h	8.57E-03 I				3700 n	31 n	140 n	100000 n	7800 n
1,1-Dimethylhydrazine	57147			2.60E+00 w	3.50E+00 w		0.026 c	0.0018 c	0.0012 c	1.1 c	0.25 c
1,2-Dimethylhydrazine	540738			3.70E+01 w	3.70E+01 w		0.0018 c	0.00017 c	0.000085 c	0.077 c	0.017 c
2,4-Dimethylphenol	105679	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
2,6-Dimethylphenol	576261	6.00E-04 I					22 n	2.2 n	0.81 n	610 n	47 n
3,4-Dimethylphenol	95658	1.00E-03 I					37 n	3.7 n	1.4 n	1000 n	78 n
1,2-Dinitrobenzene	528290	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
1,3-Dinitrobenzene	99650	1.00E-04 I					3.7 n	0.37 n	0.14 n	100 n	7.8 n
1,4-Dinitrobenzene	100254	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
4,6-Dinitro-o-cyclohexyl phenol	131895	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
2,4-Dinitrophenol	51285	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
Dinitrotoluene mixture				6.80E-01 I			0.099 c	0.0092 c	0.0046 c	4.2 c	0.94 c
2,4-Dinitrotoluene	121142	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
2,6-Dinitrotoluene	606202	1.00E-03 h					37 n	3.7 n	1.4 n	1000 n	78 n
Dinoseb	88857	1.00E-03 I					37 n	3.7 n	1.4 n	1000 n	78 n
di-n-Octyl phthalate	117840	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
1,4-Dioxane	123911			1.10E-02 I			6.1 c	0.57 c	0.29 c	260 c	58 c
Diphenamid	957517	3.00E-02 I					1100 n	110 n	41 n	31000 n	2300 n
Diphenylamine	122394	2.50E-02 I					910 n	91 n	34 n	26000 n	2000 n
1,2-Diphenylhydrazine	122667			8.00E-01 I	7.70E-01 I		0.084 c	0.0081 c	0.0039 c	3.6 c	0.8 c
Diquat	85007	2.20E-03 I					80 n	8 n	3 n	2200 n	170 n
Direct black 38	1937377			8.60E+00 h			0.0078 c	0.00073 c	0.00037 c	0.33 c	0.074 c
Direct blue 6	2602462			8.10E+00 h			0.0083 c	0.00077 c	0.00039 c	0.35 c	0.079 c
Direct brown 95	16071866			9.30E+00 h			0.0072 c	0.00067 c	0.00034 c	0.31 c	0.069 c
Disulfoton	298044	4.00E-05 I					1.5 n	0.15 n	0.054 n	41 n	3.1 n
1,4-Dithiane	505293	1.00E-02 I					370 n	37 n	14 n	10000 n	780 n
Diuron	330541	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
Dodine	2439103	4.00E-03 I					150 n	15 n	5.4 n	4100 n	310 n
Endosulfan	115297	6.00E-03 I					220 n	22 n	8.1 n	6100 n	470 n

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Endothall	145733	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Endrin	72208	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Epichlorohydrin	106898	2.00E-03 h	2.86E-04 i	9.90E-03 i	4.20E-03 i		6.8 c	1 n	0.32 c	290 c	65 c
1,2-Epoxybutane	106887		5.71E-03 i				210 n	21 n			
Ethephon (2-chloroethyl phosphonic acid)	16672870	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Ethion	563122	5.00E-04 i					18 n	1.8 n	0.68 n	510 n	39 n
2-Ethoxyethanol acetate	111159	3.00E-01 a					11000 n	1100 n	410 n	310000 n	23000 n
2-Ethoxyethanol	110805	4.00E-01 h	5.71E-02 i				15000 n	210 n	540 n	410000 n	31000 n
Ethyl acrylate	140885			4.80E-02 h			1.4 c	0.13 c	0.066 c	60 c	13 c
EPTC (S-Ethyl dipropylthiocarbamate)	759944	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Ethyl ether	60297	2.00E-01 i				•••	1200 n	730 n	270 n	200000 n	16000 n
Ethyl methacrylate	97632	9.00E-02 h					3300 n	330 n	120 n	92000 n	7000 n
Ethyl acetate	141786	9.00E-01 i					33000 n	3300 n	1200 n	920000 n	70000 n
Ethylbenzene	100414	1.00E-01 i	2.86E-01 i			•••	1300 n	1000 n	140 n	100000 n	7800 n
Ethylene cyanohydrin	109784	3.00E-01 h					11000 n	1100 n	410 n	310000 n	23000 n
Ethylene diamine	107153	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
Ethylene glycol	107211	2.00E+00 i					73000 n	7300 n	2700 n	1000000 n	160000 n
Ethylene glycol, monobutyl ether	111762		5.71E-03 h				210 n	21 n			
Ethylene oxide	75218			1.02E+00 h	3.50E-01 h		0.066 c	0.018 c	0.0031 c	2.8 c	0.63 c
Ethylene thiourea (ETU)	96457	8.00E-05 i		1.19E-01 h			0.57 c	0.053 c	0.027 c	24 c	5.4 c
Ethyl p-nitrophenyl phenylphosphorothioate	2104645	1.00E-05 i					0.37 n	0.037 n	0.014 n	10 n	0.78 n
Ethylnitrosourea	759739			1.40E+02 w			0.00048 c	0.000045 c	0.000023 c	0.02 c	0.0046 c
Ethylphthalyl ethyl glycolate	84720	3.00E+00 i					110000 n	11000 n	4100 n	1000000 n	230000 n
Express	10120	8.00E-03 i					290 n	29 n	11 n	8200 n	630 n
Fenamiphos	22224926	2.50E-04 i					9.1 n	0.91 n	0.34 n	260 n	20 n
Fluometuron	2164172	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Fluoride	7782414	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Fluoridone	59756604	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
Flurprimidol	56425913	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Flutolanil	66332965	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Fluvalinate	69409945	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
Folpet	133073	1.00E-01 i		3.50E-03 i			19 c	1.8 c	0.9 c	820 c	180 c
Fomesafen	72178020			1.90E-01 i			0.35 c	0.033 c	0.017 c	15 c	3.4 c
Fonofos	944229	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Formaldehyde	50000	2.00E-01 i			4.55E-02 i		7300 n	0.14 c	270 n	200000 n	16000 n
Formic Acid	64186	2.00E+00 h					73000 n	7300 n	2700 n	1000000 n	160000 n
Fosetyl-al	39148248	3.00E+00 i					110000 n	11000 n	4100 n	1000000 n	230000 n
Furan	110009	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Furazolidone	67458			3.80E+00 h			0.018 c	0.0016 c	0.00083 c	0.75 c	0.17 c
Furfural	98011	3.00E-03 i	1.43E-02 a				110 n	52 n	4.1 n	3100 n	230 n
Furium	531828			5.00E+01 h			0.0013 c	0.00013 c	0.000063 c	0.057 c	0.013 c
Furmecyclox	60568050			3.00E-02 i			2.2 c	0.21 c	0.11 c	95 c	21 c

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Glufosinate-ammonium	77182822	4.00E-04 I					15 n	1.5 n	0.54 n	410 n	31 n
Glycidaldehyde	765344	4.00E-04 I	2.86E-04 h				15 n	1 n	0.54 n	410 n	31 n
Glyphosate	1071836	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n
Haloxyfop-methyl	69806402	5.00E-05 I					1.8 n	0.18 n	0.068 n	51 n	3.9 n
Harmony	79277273	1.30E-02 I					470 n	47 n	18 n	13000 n	1000 n
HCH (alpha)	319846			6.30E+00 I	6.30E+00 I		0.011 c	0.00099 c	0.0005 c	0.45 c	0.1 c
HCH (beta)	319857			1.80E+00 I	1.80E+00 I		0.037 c	0.0035 c	0.0018 c	1.6 c	0.35 c
HCH (gamma) Lindane	58899	3.00E-04 I		1.30E+00 h			0.052 c	0.0048 c	0.0024 c	2.2 c	0.49 c
HCH-technical	608731			1.80E+00 I	1.79E+00 I		0.037 c	0.0035 c	0.0018 c	1.6 c	0.35 c
Heptachlor	76448	5.00E-04 I		4.50E+00 I	4.55E+00 I	•••	0.0023 c	0.0014 c	0.0007 c	0.64 c	0.14 c
Heptachlor epoxide	1024573	1.30E-05 I		9.10E+00 I	9.10E+00 I	•••	0.0012 c	0.00069 c	0.00035 c	0.31 c	0.07 c
Hexabromobenzene	87821	2.00E-03 I				•••	12 n	7.3 n	2.7 n	2000 n	160 n
Hexachlorobenzene	118741	8.00E-04 I		1.60E+00 I	1.61E+00 I	•••	0.0066 c	0.0039 c	0.002 c	1.8 c	0.4 c
Hexachlorobutadiene	87683	2.00E-04 h		7.80E-02 I	7.70E-02 I	•••	0.14 c	0.081 c	0.04 c	37 c	8.2 c
Hexachlorocyclopentadiene	77474	7.00E-03 I	2.00E-05 h			•••	0.15 n	0.073 n	9.5 n	7200 n	550 n
Hexachlorodibenzo-p-dioxin mixture	19408743			6.20E+03 I	4.55E+03 I		0.000011 c	1.40E-06 c	5.10E-07 c	0.00046 c	0.0001 c
Hexachloroethane	67721	1.00E-03 I		1.40E-02 I	1.40E-02 I	•••	0.75 c	0.45 c	0.23 c	200 c	46 c
Hexachlorophene	70304	3.00E-04 I					11 n	1.1 n	0.41 n	310 n	23 n
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121824	3.00E-03 I		1.10E-01 I			0.61 c	0.057 c	0.029 c	26 c	5.8 c
1,6-Hexamethylene diisocyanate	822060		2.86E-06 I				0.1 n	0.01 n			
n-Hexane	110543	6.00E-02 h	5.71E-02 I			•••	350 n	210 n	81 n	61000 n	4700 n
Hexazinone	51235042	3.30E-02 I					1200 n	120 n	45 n	34000 n	2600 n
Hydrazine, hydrazine sulfate	302012			3.00E+00 I	1.71E+01 I		0.022 c	0.00037 c	0.0011 c	0.95 c	0.21 c
Hydrogen chloride	7647010		2.00E-03 I				73 n	7.3 n			
Hydrogen sulfide	7783064	3.00E-03 I	2.57E-04 I				110 n	0.94 n	4.1 n	3100 n	230 n
Hydroquinone	123319	4.00E-02 h					1500 n	150 n	54 n	41000 n	3100 n
Imazalil	35554440	1.30E-02 I					470 n	47 n	18 n	13000 n	1000 n
Imazaquin	81335377	2.50E-01 I					9100 n	910 n	340 n	260000 n	20000 n
Iprodione	36734197	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
Isobutanol	78831	3.00E-01 I				•••	1800 n	1100 n	410 n	310000 n	23000 n
Isophorone	78591	2.00E-01 I		9.50E-04 I			71 c	6.6 c	3.3 c	3000 c	670 c
Isopropalin	33820530	1.50E-02 I					550 n	55 n	20 n	15000 n	1200 n
Isopropyl methyl phosphonic acid	1832548	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n
Isoxaben	82558507	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Kepone	143500			1.80E+01 e			0.0037 c	0.00035 c	0.00018 c	0.16 c	0.035 c
Lactofen	77501634	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
Lead (tetraethyl)	78002	1.00E-07 I					0.0037 n	0.00037 n	0.00014 n	0.1 n	0.0078 n
Linuron	330552	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
Lithium	7439932	2.00E-02 e					730 n	73 n	27 n	20000 n	1600 n
Londax	83056996	2.00E-01 I					7300 n	730 n	270 n	200000 n	16000 n
Malathion	121755	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
Maleic anhydride	108316	1.00E-01 I					3700 n	370 n	140 n	100000 n	7800 n

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Maleic hydrazide	123331	5.00E-01 i					18000 n	1800 n	680 n	510000 n	39000 n
Malononitrile	109773	2.00E-05 h					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Mancozeb	8018017	3.00E-02 h					1100 n	110 n	41 n	31000 n	2300 n
Maneb	12427382	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Manganese and compounds	7439965	5.00E-03 i	1.43E-05 i				180 n	0.052 n	6.8 n	5100 n	390 n
Mephosfolan	950107	9.00E-05 h					3.3 n	0.33 n	0.12 n	92 n	7 n
Mepiquat chloride	24307264	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
Mercury (inorganic)	7439976	3.00E-04 h	8.57E-05 h				11 n	0.31 n	0.41 n	310 n	23 n
Mercury (methyl)	22967926	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Merphos	150505	3.00E-05 i					1.1 n	0.11 n	0.041 n	31 n	2.3 n
Merphos oxide	78488	3.00E-05 i					1.1 n	0.11 n	0.041 n	31 n	2.3 n
Metalaxyl	57837191	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Methacrylonitrile	126987	1.00E-04 i	2.00E-04 a				3.7 n	0.73 n	0.14 n	100 n	7.8 n
Methamidophos	10265926	5.00E-05 i					1.8 n	0.18 n	0.068 n	51 n	3.9 n
Methanol	67561	5.00E-01 i					18000 n	1800 n	680 n	510000 n	39000 n
Methidathion	950378	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Methomyl	16752775	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Methoxychlor	72435	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
2-Methoxyethanol acetate	110496	2.00E-03 a					73 n	7.3 n	2.7 n	2000 n	160 n
2-Methoxyethanol	109864	1.00E-03 h	5.71E-03 i				37 n	21 n	1.4 n	1000 n	78 n
2-Methoxy-5-nitroaniline	99592			4.60E-02 h			1.5 c	0.14 c	0.069 c	62 c	14 c
Methyl acetate	79209	1.00E+00 h					37000 n	3700 n	1400 n	1000000 n	78000 n
Methyl acrylate	96333	3.00E-02 a					1100 n	110 n	41 n	31000 n	2300 n
2-Methylaniline hydrochloride	636215			1.80E-01 h			0.37 c	0.035 c	0.018 c	16 c	3.5 c
2-Methylaniline	95534			2.40E-01 h			0.28 c	0.026 c	0.013 c	12 c	2.7 c
Methyl chlorocarbonate	79221	1.00E+00 w					37000 n	3700 n	1400 n	1000000 n	78000 n
4-(2-Methyl-4-chlorophenoxy) butyric acid	94815	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
2-Methyl-4-chlorophenoxyacetic acid	94746	5.00E-04 i					18 n	1.8 n	0.68 n	510 n	39 n
2-(2-Methyl-14-chlorophenoxy)propionic acid	93652	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Methylcyclohexane	108872		8.57E-01 h				31000 n	3100 n			
Methylene bromide	74953	1.00E-02 a				***	61 n	37 n	14 n	10000 n	780 n
Methylene chloride	75092	6.00E-02 i	8.57E-01 h	7.50E-03 i	1.64E-03 i	***	4.1 c	3.8 c	0.42 c	380 c	85 c
4,4'-Methylene bis(2-chloroaniline)	101144	7.00E-04 h		1.30E-01 h	1.30E-01 h		0.52 c	0.048 c	0.024 c	22 c	4.9 c
4,4'-Methylenebisbenzeneamine	101779			2.50E-01 w			0.27 c	0.025 c	0.013 c	11 c	2.6 c
4,4'-Methylene bis(N,N'-dimethyl)aniline	101611			4.60E-02 i			1.5 c	0.14 c	0.069 c	62 c	14 c
4,4'-Methylenediphenyl isocyanate	101688		5.71E-06 i			***	0.035 n	0.021 n			
Methyl ethyl ketone	78933	6.00E-01 i	2.86E-01 i			***	1900 n	1000 n	810 n	610000 n	47000 n
Methyl hydrazine	60344			1.10E+00 w			0.061 c	0.0057 c	0.0029 c	2.6 c	0.58 c
Methyl isobutyl ketone	108101	8.00E-02 h	2.29E-02 a				2900 n	84 n	110 n	82000 n	6300 n
Methyl methacrylate	80626	8.00E-02 h					2900 n	290 n	110 n	82000 n	6300 n
2-Methyl-5-nitroaniline	99558			3.30E-02 h			2 c	0.19 c	0.096 c	87 c	19 c
Methyl parathion	298000	2.50E-04 i					9.1 n	0.91 n	0.34 n	260 n	20 n

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2-Methylphenol (o-cresol)	95487	5.00E-02 l					1800 n	180 n	68 n	51000 n	3900 n
3-Methylphenol (m-cresol)	103394	5.00E-02 l					1800 n	180 n	68 n	51000 n	3900 n
4-Methylphenol (p-cresol)	106445	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Methyl styrene (mixture)	25013154	6.00E-03 a	1.14E-02 a			•••	60 n	42 n	8.1 n	6100 n	470 n
Methyl styrene (alpha)	98839	7.00E-02 a				•••	430 n	260 n	95 n	72000 n	5500 n
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03 e	8.57E-01 l			•••	180 n	3100 n	6.8 n	5100 n	390 n
Metolaclor (Dual)	51218452	1.50E-01 h					5500 n	550 n	200 n	150000 n	12000 n
Metribuzin	21807649	2.50E-02 l					910 n	91 n	34 n	26000 n	2000 n
Mirex	2385855	2.00E-04 l		1.80E+00 w			0.037 c	0.0035 c	0.0018 c	1.6 c	0.35 c
Molinate	2212671	2.00E-03 l					73 n	7.3 n	2.7 n	2000 n	160 n
Molybdenum	7439987	5.00E-03 l					180 n	18 n	6.8 n	5100 n	390 n
Monochloramine	10599903	1.00E-01 l					3700 n	370 n	140 n	100000 n	7800 n
Naled	300765	2.00E-03 l					73 n	7.3 n	2.7 n	2000 n	160 n
2-Naphthylamine	91598			1.30E+02 e			0.00052 c	0.000048 c	0.000024 c	0.022 c	0.0049 c
Napropamide	15299997	1.00E-01 l					3700 n	370 n	140 n	100000 n	7800 n
Nickel refinery dust					8.40E-01 l			0.0075 c			
Nickel (soluble salts)	7440020	2.00E-02 l					730 n	73 n	27 n	20000 n	1600 n
Nickel subsulfide	12035722				1.70E+00 l			0.0037 c			
Nitrapyrin	1929824	1.50E-03 w					55 n	5.5 n	2 n	1500 n	120 n
Nitrate	14797558	1.60E+00 l					58000 n	5800 n	2200 n	1000000 n	130000 n
Nitric Oxide	10102439	1.00E-01 w					3700 n	370 n	140 n	100000 n	7800 n
Nitrite	14797650	1.00E-01 l					3700 n	370 n	140 n	100000 n	7800 n
2-Nitroaniline	88744	6.00E-05 w	5.71E-05 h				2.2 n	0.21 n	0.081 n	61 n	4.7 n
3-Nitroaniline	99092	3.00E-03 o					110 n	11 n	4.1 n	3100 n	230 n
4-Nitroaniline	100016	3.00E-03 o					110 n	11 n	4.1 n	3100 n	230 n
Nitrobenzene	98953	5.00E-04 l	5.71E-04 a			•••	3.4 n	2.1 n	0.68 n	510 n	39 n
Nitrofurantoin	67209	7.00E-02 h					2600 n	260 n	95 n	72000 n	5500 n
Nitrofurazone	59870			1.50E+00 h	9.40E+00 h		0.045 c	0.00067 c	0.0021 c	1.9 c	0.43 c
Nitrogen dioxide	10102440	1.00E+00 w					37000 n	3700 n	1400 n	1000000 n	78000 n
Nitroguanidine	556887	1.00E-01 l					3700 n	370 n	140 n	100000 n	7800 n
4-Nitrophenol	100027	6.20E-02 o					2300 n	230 n	84 n	63000 n	4800 n
2-Nitropropane	79469		5.71E-03 l		9.40E+00 h		210 n	0.00067 c			
N-Nitrosodi-n-butylamine	924163			5.40E+00 l	5.60E+00 l		0.012 c	0.0011 c	0.00058 c	0.53 c	0.12 c
N-Nitrosodiethanolamine	1116547			2.80E+00 l			0.024 c	0.0022 c	0.0011 c	1 c	0.23 c
N-Nitrosodiethylamine	55185			1.50E+02 l	1.51E+02 l		0.00045 c	0.000041 c	0.000021 c	0.019 c	0.0043 c
N-Nitrosodimethylamine	62759			5.10E+01 l	4.90E+01 l		0.0013 c	0.00013 c	0.000062 c	0.056 c	0.013 c
N-Nitrosodiphenylamine	86306			4.90E-03 l			14 c	1.3 c	0.64 c	580 c	130 c
N-Nitroso di-n-propylamine	621647			7.00E+00 l			0.0096 c	0.00089 c	0.00045 c	0.41 c	0.091 c
N-Nitroso-N-methylethylamine	10595956			2.20E+01 l			0.0031 c	0.00028 c	0.00014 c	0.13 c	0.029 c
N-Nitrosopyrrolidine	930552			2.10E+00 l	2.13E+00 l		0.032 c	0.0029 c	0.0015 c	1.4 c	0.3 c
m-Nitrotoluene	99081	1.00E-02 h				•••	61 n	37 n	14 n	10000 n	780 n
o-Nitrotoluene	88722	1.00E-02 h				•••	61 n	37 n	14 n	10000 n	780 n

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p-Nitrotoluene	99990	1.00E-02 h				•••	61 n	37 n	14 n	10000 n	780 n
Norflurazon	27314132	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
NuStar	85509199	7.00E-04 I					26 n	2.6 n	0.95 n	720 n	55 n
Octabromodiphenyl ether	32536520	3.00E-03 I					110 n	11 n	4.1 n	3100 n	230 n
Octahydro-1357-tetranitro-1357-tetrazocine	2691410	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Octamethylpyrophosphoramide	152169	2.00E-03 h					73 n	7.3 n	2.7 n	2000 n	160 n
Oryzalin	19044883	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Oxadiazon	19666309	5.00E-03 I					180 n	18 n	6.8 n	5100 n	390 n
Oxamyl	23135220	2.50E-02 I					910 n	91 n	34 n	26000 n	2000 n
Oxyfluorfen	42874033	3.00E-03 I					110 n	11 n	4.1 n	3100 n	230 n
Paclobutrazol	76738620	1.30E-02 I					470 n	47 n	18 n	13000 n	1000 n
Paraquat	1910425	4.50E-03 I					160 n	16 n	6.1 n	4600 n	350 n
Parathion	56382	6.00E-03 h					220 n	22 n	8.1 n	6100 n	470 n
Pebulate	1114712	5.00E-02 h					1800 n	180 n	68 n	51000 n	3900 n
Pendimethalin	40487421	4.00E-02 I					1500 n	150 n	54 n	41000 n	3100 n
Pentabromo-6-chloro cyclohexane	87843			2.30E-02 h			2.9 c	0.27 c	0.14 c	120 c	28 c
Pentabromodiphenyl ether	32534819	2.00E-03 I					73 n	7.3 n	2.7 n	2000 n	160 n
Pentachlorobenzene	608935	8.00E-04 I				•••	4.9 n	2.9 n	1.1 n	820 n	63 n
Pentachloronitrobenzene	82688	3.00E-03 I		2.60E-01 h		•••	0.041 c	0.024 c	0.012 c	11 c	2.5 c
Pentachlorophenol	87865	3.00E-02 I		1.20E-01 I			0.56 c	0.052 c	0.026 c	24 c	5.3 c
Permethrin	52645531	5.00E-02 I					1800 n	180 n	68 n	51000 n	3900 n
Phenmedipham	13684634	2.50E-01 I					9100 n	910 n	340 n	260000 n	20000 n
Phenol	108952	6.00E-01 I					22000 n	2200 n	810 n	610000 n	47000 n
m-Phenylenediamine	108452	6.00E-03 I					220 n	22 n	8.1 n	6100 n	470 n
p-Phenylenediamine	106503	1.90E-01 h					6900 n	690 n	260 n	190000 n	15000 n
Phenylmercuric acetate	62384	8.00E-05 I					2.9 n	0.29 n	0.11 n	82 n	6.3 n
2-Phenylphenol	90437			1.94E-03 h			35 c	3.2 c	1.6 c	1500 c	330 c
Phorate	298022	2.00E-04 h					7.3 n	0.73 n	0.27 n	200 n	16 n
Phosmet	732116	2.00E-02 I					730 n	73 n	27 n	20000 n	1600 n
Phosphine	7803512	3.00E-04 I	8.57E-06 h				11 n	0.031 n	0.41 n	310 n	23 n
Phosphorus (white)	7723140	2.00E-05 I					0.73 n	0.073 n	0.027 n	20 n	1.6 n
p-Phthalic acid	100210	1.00E+00 h					37000 n	3700 n	1400 n	1000000 n	78000 n
Phthalic anhydride	85449	2.00E+00 I	3.43E-01 h				73000 n	1300 n	2700 n	1000000 n	160000 n
Picloram	1918021	7.00E-02 I					2600 n	260 n	95 n	72000 n	5500 n
Pirimiphos-methyl	29232937	1.00E-02 I					370 n	37 n	14 n	10000 n	780 n
Polybrominated biphenyls	-	7.00E-06 h		8.90E+00 h			0.0076 c	0.0007 c	0.00035 c	0.32 c	0.072 c
Polychlorinated biphenyls (PCBs)	1336363			7.70E+00 I			0.0087 c	0.00081 c	0.00041 c	0.37 c	0.083 c
Aroclor 1016	12674112	7.00E-05 I					2.6 n	0.26 n	0.095 n	72 n	5.5 n
Aroclor 1254	11097691	2.00E-05 I					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Polychlorinated terphenyls (PCTs)				4.50E+00 •			0.015 c	0.0014 c	0.0007 c	0.64 c	0.14 c
Polynuclear aromatic hydrocarbons											
Acenaphthene	83329	6.00E-02 I					2200 n	220 n	81 n	61000 n	4700 n

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Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Tap water µg/L	Ambient air µg/m3	Fish mg/kg	Industrial soil mg/kg	Residential soil mg/kg
Anthracene	120127	3.00E-01 i					11000 n	1100 n	410 n	310000 n	23000 n
Benzo[a]pyrene	50328			7.30E+00 i	6.10E+00 h		0.0092 c	0.001 c	0.00043 c	0.39 c	0.088 c
Benzo[b]fluoranthene	205992			7.30E-01 e	6.10E-01 e		0.092 c	0.01 c	0.0043 c	3.9 c	0.88 c
Benzo[k]fluoranthene	207089			7.30E-02 e	6.10E-02 e		0.92 c	0.1 c	0.043 c	39 c	8.8 c
Benz[a]anthracene	56553			7.30E-01 e	6.10E-01 e		0.092 c	0.01 c	0.0043 c	3.9 c	0.88 c
Chrysene	218019			7.30E-03 e	6.10E-03 e		9.2 c	1 c	0.43 c	390 c	88 c
Dibenz[ah]anthracene	53703			7.30E+00 e	6.10E+00 e		0.0092 c	0.001 c	0.00043 c	0.39 c	0.088 c
Fluoranthene	206440	4.00E-02 i					1500 n	150 n	54 n	41000 n	3100 n
Fluorene	86737	4.00E-02 i					1500 n	150 n	54 n	41000 n	3100 n
Indeno[1,2,3-cd]pyrene	193395			7.30E-01 e	6.10E-01 e		0.092 c	0.01 c	0.0043 c	3.9 c	0.88 c
Naphthalene	91203	4.00E-02 w					1500 n	150 n	54 n	41000 n	3100 n
Pyrene	129000	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
Prochloraz	67747095	9.00E-03 i		1.50E-01 i			0.45 c	0.042 c	0.021 c	19 c	4.3 c
Profluralin	26399360	6.00E-03 h					220 n	22 n	8.1 n	6100 n	470 n
Prometon	1610180	1.50E-02 i					550 n	55 n	20 n	15000 n	1200 n
Prometryn	7287196	4.00E-03 i					150 n	15 n	5.4 n	4100 n	310 n
Pronamide	23950585	7.50E-02 i					2700 n	270 n	100 n	77000 n	5900 n
Propachlor	1918167	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Propanil	709988	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Propargite	2312358	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Propargyl alcohol	107197	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Propazine	139402	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Propham	122429	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Propiconazole	60207901	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Propylene glycol	57556	2.00E+01 h					730000 n	73000 n	27000 n	1000000 n	1000000 n
Propylene glycol, monoethyl ether	52125538	7.00E-01 h					26000 n	2600 n	950 n	720000 n	55000 n
Propylene glycol, monomethyl ether	107982	7.00E-01 h	5.71E-01 i				26000 n	2100 n	950 n	720000 n	55000 n
Propylene oxide	75569		8.57E-03 i	2.40E-01 i	1.29E-02 i		0.28 c	0.49 c	0.013 c	12 c	2.7 c
Pursuit	81335775	2.50E-01 i					9100 n	910 n	340 n	260000 n	20000 n
Pydrin	51630581	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Pyridine	110861	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Quinalphos	13593038	5.00E-04 i					18 n	1.8 n	0.68 n	510 n	39 n
Quinoline	91225			1.20E+01 h			0.0056 c	0.00052 c	0.00026 c	0.24 c	0.053 c
Resmethrin	10463868	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
Ronnel	299843	5.00E-02 h					1800 n	180 n	68 n	51000 n	3900 n
Rotenone	83794	4.00E-03 i					150 n	15 n	5.4 n	4100 n	310 n
Savey	78587050	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Selenious Acid	7783008	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Selenium	7782492	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Selenourea	630104	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Sethoxydim	74051802	9.00E-02 i					3300 n	330 n	120 n	92000 n	7000 n
Silver and compounds	7440224	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n

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Simazine	122349	5.00E-03 i		1.20E-01 h			0.56 c	0.052 c	0.026 c	24 c	5.3 c
Sodium azide	26628228	4.00E-03 i					150 n	15 n	5.4 n	4100 n	310 n
Sodium diethyldithiocarbamate	148185	3.00E-02 i		2.70E-01 h			0.25 c	0.023 c	0.012 c	11 c	2.4 c
Sodium fluoroacetate	62748	2.00E-05 i					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Sodium metavanadate	13718268	1.00E-03 h					37 n	3.7 n	1.4 n	1000 n	78 n
Strontium, stable	7440246	6.00E-01 i					22000 n	2200 n	810 n	610000 n	47000 n
Strychnine	57249	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Styrene	100425	2.00E-01 i	2.86E-01 i			•••	1600 n	1000 n	270 n	200000 n	16000 n
Systhane	88671890	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
2,3,7,8-TCDD (dioxin)	1746016			1.56E+05 h	1.16E+05 h		4.30E-07 c	5.40E-08 c	2.00E-08 c	0.000018 c	4.10E-06 c
Tebuthiuron	34014181	7.00E-02 i					2600 n	260 n	95 n	72000 n	5500 n
Temephos	3383968	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
Terbacil	5902512	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Terbufos	13071799	2.50E-05 h					0.91 n	0.091 n	0.034 n	26 n	2 n
Terbutryn	886500	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
1,2,4,5-Tetrachlorobenzene	95943	3.00E-04 i				•••	1.8 n	1.1 n	0.41 n	310 n	23 n
1,1,1,2-Tetrachloroethane	630206	3.00E-02 i		2.60E-02 i	2.59E-02 i	•••	0.41 c	0.24 c	0.12 c	110 c	25 c
1,1,2,2-Tetrachloroethane	79345			2.00E-01 i	2.03E-01 i	•••	0.052 c	0.031 c	0.016 c	14 c	3.2 c
Tetrachloroethylene (PCE)	127184	1.00E-02 i		5.20E-02 e	2.03E-03 e	•••	1.1 c	3.1 c	0.061 c	55 c	12 c
2,3,4,6-Tetrachlorophenol	58902	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
p,a,a,a-Tetrachlorotoluene	5216251			2.00E+01 h		•••	0.00053 c	0.00031 c	0.00016 c	0.14 c	0.032 c
Tetrachlorovinphos	961115	3.00E-02 i		2.40E-02 h			2.8 c	0.26 c	0.13 c	120 c	27 c
Tetraethyldithiopyrophosphate	3689245	5.00E-04 i					18 n	1.8 n	0.68 n	510 n	39 n
Thallic oxide	1314325	7.00E-05 w					2.6 n	0.26 n	0.095 n	72 n	5.5 n
Thallium											
Thallium acetate	563688	9.00E-05 i					3.3 n	0.33 n	0.12 n	92 n	7 n
Thallium carbonate	6533739	8.00E-05 i					2.9 n	0.29 n	0.11 n	82 n	6.3 n
Thallium chloride	7791120	8.00E-05 i					2.9 n	0.29 n	0.11 n	82 n	6.3 n
Thallium nitrate	10102451	9.00E-05 i					3.3 n	0.33 n	0.12 n	92 n	7 n
Thallium selenite	12039520	9.00E-05 w					3.3 n	0.33 n	0.12 n	92 n	7 n
Thallium sulfate	7446186	8.00E-05 i					2.9 n	0.29 n	0.11 n	82 n	6.3 n
Thiobencarb	28249776	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
2-(Thiocyanomethylthio)-benzothiazole	21564170	3.00E-02 h					1100 n	110 n	41 n	31000 n	2300 n
Thiofanox	39196184	3.00E-04 h					11 n	1.1 n	0.41 n	310 n	23 n
Thiophanate-methyl	23564058	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
Thiram	137268	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Tin and compounds		6.00E-01 h					22000 n	2200 n	810 n	610000 n	47000 n
Toluene	108883	2.00E-01 i	1.14E-01 w			•••	750 n	420 n	270 n	200000 n	16000 n
Toluene-2,4-diamine	95807			3.20E+00 h			0.021 c	0.002 c	0.00099 c	0.89 c	0.2 c
Toluene-2,5-diamine	95705	6.00E-01 h					22000 n	2200 n	810 n	610000 n	47000 n
Toluene-2,6-diamine	823405	2.00E-01 h					7300 n	730 n	270 n	200000 n	16000 n
p-Toluidine	106490			1.90E-01 h			0.35 c	0.033 c	0.017 c	15 c	3.4 c

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Toxaphene	8001352			1.10E+00 i	1.12E+00 i		0.061 c	0.0056 c	0.0029 c	2.6 c	0.58 c
Tralomethrin	66841256	7.50E-03 i					270 n	27 n	10 n	7700 n	590 n
Triallate	2303175	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Triasulfuron	82097505	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
1,2,4-Tribromobenzene	615543	5.00E-03 i				***	30 n	18 n	6.8 n	5100 n	390 n
Tributyltin oxide (TBTO)	56359	3.00E-05 i					1.1 n	0.11 n	0.041 n	31 n	2.3 n
2,4,6-Trichloroaniline hydrochloride	33663502			2.90E-02 h			2.3 c	0.22 c	0.11 c	99 c	22 c
2,4,6-Trichloroaniline	634935			3.40E-02 h			2 c	0.18 c	0.093 c	84 c	19 c
1,2,4-Trichlorobenzene	120821	1.00E-02 i	5.71E-02 h			***	190 n	210 n	14 n	10000 n	780 n
1,1,1-Trichloroethane	71556	9.00E-02 w	2.86E-01 w			***	1300 n	1000 n	120 n	92000 n	7000 n
1,1,2-Trichloroethane	79005	4.00E-03 i		5.70E-02 i	5.60E-02 i	***	0.19 c	0.11 c	0.055 c	50 c	11 c
Trichloroethylene (TCE)	79016	6.00E-03 e		1.10E-02 w	6.00E-03 e	***	1.6 c	1 c	0.29 c	260 c	58 c
Trichlorofluoromethane	75694	3.00E-01 i	2.00E-01 a			***	1300 n	730 n	410 n	310000 n	23000 n
2,4,5-Trichlorophenol	95954	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
2,4,6-Trichlorophenol	88062			1.10E-02 i	1.09E-02 i		6.1 c	0.57 c	0.29 c	260 c	58 c
2,4,5-Trichlorophenoxyacetic acid	93765	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
2-(2,4,5-Trichlorophenoxy)propionic acid	93721	8.00E-03 i					290 n	29 n	11 n	8200 n	630 n
1,1,2-Trichloropropane	598776	5.00E-03 i				***	30 n	18 n	6.8 n	5100 n	390 n
1,2,3-Trichloropropane	96184	6.00E-03 i		7.00E+00 i		***	0.0015 c	0.00089 c	0.00045 c	0.41 c	0.091 c
1,2,3-Trichloropropene	96195	5.00E-03 h				***	30 n	18 n	6.8 n	5100 n	390 n
1,1,2-Trichloro-1,2,2- trifluoroethane	76131	3.00E+01 i	8.57E+00 h			***	59000 n	31000 n	41000 n	1000000 n	1000000 n
Tridiphane	58138082	3.00E-03 i					110 n	11 n	4.1 n	3100 n	230 n
Triethylamine	121448		2.00E-03 i				73 n	7.3 n			
Trifluralin	1582098	7.50E-03 i		7.70E-03 i			8.7 c	0.81 c	0.41 c	370 c	83 c
1,2,4-Trimethylbenzene	95636	5.00E-04 e				***	3 n	1.8 n	0.68 n	510 n	39 n
1,3,5-Trimethylbenzene	108678	4.00E-04 e				***	2.4 n	1.5 n	0.54 n	410 n	31 n
Trimethyl phosphate	512561			3.70E-02 h			1.8 c	0.17 c	0.085 c	77 c	17 c
1,3,5-Trinitrobenzene	99354	5.00E-05 i					1.8 n	0.18 n	0.068 n	51 n	3.9 n
Trinitrophenylmethylnitramine	479458	1.00E-02 h					370 n	37 n	14 n	10000 n	780 n
2,4,6-Trinitrotoluene	118967	5.00E-04 i		3.00E-02 i			2.2 c	0.21 c	0.11 c	95 c	21 c
Uranium (soluble salts)	7440611	3.00E-03 i					110 n	11 n	4.1 n	3100 n	230 n
Vanadium	7440622	7.00E-03 h					260 n	26 n	9.5 n	7200 n	550 n
Vanadium pentoxide	1314621	9.00E-03 i					330 n	33 n	12 n	9200 n	700 n
Vanadium sulfate	36907423	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
Vernam	1929777	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Vinclozolin	50471448	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Vinyl acetate	108054	1.00E+00 h	5.71E-02 i				37000 n	210 n	1400 n	1000000 n	78000 n
Vinyl bromide	593602		8.57E-04 i			***	5.2 n	3.1 n			
Vinyl chloride	75014			1.90E+00 h	3.00E-01 h	***	0.019 c	0.021 c	0.0017 c	1.5 c	0.34 c
Warfarin	81812	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
m-Xylene	108323	2.00E+00 h	2.00E-01 w			***	1400 n	730 n	2700 n	1000000 n	160000 n
o-Xylene	95476	2.00E+00 h	2.00E-01 w			***	1400 n	730 n	2700 n	1000000 n	160000 n

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p-Xylene	1.06E+05		8.57E-02 w			•••	5.20E+02 n	3.10E+02 n			
Xylene (mixed)	1.33E+06	2.00E+00 i				•••	12000 n	7300 n	2700 n	1000000 n	160000 n
Zinc	7.44E+06	3.00E-01 i					11000 n	1100 n	410 n	310000 n	23000 n
Zinc phosphide	1.31E+06	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Zineb	1.21E+07	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n

Screening Criteria

Screening Criteria - Waters

Analyte	Screening Criteria mg/L	Source
Acenaphthene	2.2	RN
Acenaphthylene	NA	NA
Acetone	3.7	RN
Aldrin	0.0000040	RC
Alkalinity	NA	NA
Aluminum	NA	NA
Anthracene	11	RN
Antimony	0.0060	M
Arsenic	0.050	M
alpha-BHC	0.000011	RC
beta-BHC	0.000037	RC
delta-BHC	NA	NA
gamma-BHC	0.00020	M
Barium	2.0	M
Benz(a)anthracene	0.00010	M
Benzene	0.0050	M
Benzo(a)pyrene	0.00020	M
Benzo(b)fluoranthene	0.00020	M
Benzo(g,h,i)perylene	NA	NA
Benzo(k)fluoranthene	0.00020	M
Benzoic acid	150	RN
Benzyl alcohol	11	RN
Beryllium	0.0040	M
Bromobenzene	NA	NA
Bromodichloromethane	0.00017	RC
Bromoform	0.0024	RC
Bromomethane	0.0087	RN
4-Bromophenyl phenyl ether	2.1	RN
2-Butanone (MEK)	22	RN
Butylbenzylphthalate	0.10	M
Cadmium	0.0050	M
Calcium	NA	NA
Carbon disulfide	0.021	RN

Screening Criteria - Waters (Continued)

Analyte	Screening Criteria mg/L	Source
Carbon tetrachloride	0.0050	M
Chlordane	0.0020	M
Chloride	NA	NA
4-Chloro-3-methylphenol	NA	NA
4-Chloroaniline	0.15	RN
Chlorobenzene	0.039	RN
Chloroethane	8.6	RN
bis(2-Chloroethoxy)methane	NA	NA
2-Chloroethyl vinyl ether	0.15	RN
bis(2-Chloroethyl)ether	0.0000092	RC
Chloroform	0.00015	RC
1-Chlorohexane	NA	NA
bis(2-Chloroisopropyl)ether	0.00026	RC
Chloromethane	0.0014	RC
2-Chloronaphthalene	2.9	RN
2-Chlorophenol	0.18	RN
4-Chlorophenyl phenyl ether	NA	NA
Chromium	0.10	M
Chrysene	0.00020	M
Cobalt	2.2	RN
Copper	1.3	M
4,4'-DDD	0.00028	RC
4,4'-DDE	0.00020	RC
4,4'-DDT	0.00020	RC
Di-n-octylphthalate	0.73	RN
Dibenz(a,h)anthracene	0.00030	M
Dibenzofuran	NA	NA
Dibromochloromethane	0.00013	RC
Dibromomethane	NA	NA
Dibutyl phthalate	3.7	RN
trans-1,4-Dichloro-2-butene	0.0000011	RC
1,2-Dichlorobenzene	0.60	M
1,3-Dichlorobenzene	0.60	M
1,4-Dichlorobenzene	0.075	M

Screening Criteria - Waters (Continued)

Analyte	Screening Criteria mg/L	Source
3,3'-Dichlorobenzidine	0.00015	RC
Dichlorodifluoromethane	0.39	RN
1,1-Dichloroethane	0.81	RN
1,2-Dichloroethane	0.0050	M
1,1-Dichloroethene	0.0070	M
cis-1,2-Dichloroethene	0.070	M
trans-1,2-Dichloroethene	0.10	M
2,4-Dichlorophenol	0.11	RN
1,2-Dichloropropane	0.0050	M
cis-1,3-Dichloropropene	0.000077	RC
trans-1,3-Dichloropropene	0.000077	RC
Dieldrin	0.0000042	RC
Diesel Range Organics	0.052	RN
Diethylphthalate	29	RN
2,4-Dimethylphenol	0.73	RN
Dimethylphthalate	370	RN
4,6-Dinitro-2-methylphenol	NA	NA
2,4-Dinitrophenol	0.073	RN
2,4-Dinitrotoluene	0.073	RN
2,6-Dinitrotoluene	0.037	RN
Diphenylamine/N-NitrosoDPA	0.91	RN
Endosulfan I	0.22	RN
Endosulfan II	0.22	RN
Endosulfan sulfate	0.22	RN
Endrin	0.0020	M
Endrin aldehyde	0.011	RN
Ethanol	NA	NA
Ethyl ether	1.2	RN
Ethyl methacrylate	3.3	RN
Ethylbenzene	0.70	M
bis(2-Ethylhexyl)phthalate	0.0060	M
Fluoranthene	1.5	RN
Fluorene	1.5	RN
2-Fluorobiphenyl	NA	NA

Screening Criteria - Waters (Continued)

Analyte	Screening Criteria mg/L	Source
2-Fluorophenol	NA	NA
Gasoline Range Organics	0.026	RN
Heptachlor	0.00040	M
Heptachlor epoxide	0.00020	M
Hexachlorobenzene	0.0010	M
Hexachlorobutadiene	0.00014	RC
Hexachlorocyclopentadiene	0.050	M
Hexachloroethane	0.00075	RC
2-Hexanone	NA	NA
Indeno(1,2,3-cd)pyrene	0.00040	M
Iodomethane	NA	NA
Iron	NA	NA
Isophorone	0.071	RC
Lead	0.015	M
Magnesium	NA	NA
Manganese	0.18	RN
Mercury	0.0020	M
Methoxychlor	0.040	M
4-Methyl-2-Pentanone(MIBK)	2.9	RN
Methylene chloride	0.0050	M
2-Methylnaphthalene	NA	NA
3-Methylphenol(m-cresol)	1.8	RN
2-Methylphenol(o-cresol)	1.8	RN
4-Methylphenol(p-cresol)	0.18	RN
Molybdenum	0.18	RN
N-Nitrosodiphenylamine	0.014	RC
N-Nitrosodipropylamine	0.0000096	RC
Naphthalene	1.5	RN
Nickel	0.10	M
Nitrate-Nitrite as N	1.0	M
2-Nitroaniline	0.0022	RN
3-Nitroaniline	0.11	RN
4-Nitroaniline	0.11	RN
Nitrobenzene	0.0034	RN

Screening Criteria - Waters (Continued)

Analyte	Screening Criteria mg/L	Source
2-Nitrophenol	NA	NA
4-Nitrophenol	2.3	RN
OCDD	0.000030	M
OCDF	0.000030	M
PCB-1016	0.00050	M
PCB-1221	0.00050	M
PCB-1232	0.00050	M
PCB-1242	0.00050	M
PCB-1248	0.00050	M
PCB-1248	0.00050	M
PCB-1254	0.00050	M
PCB-1260	0.00050	M
PCBs	0.00050	M
PeCDD Totals	0.00000006	M
PeCDF Totals	0.00000006	M
Pentachlorophenol	0.0010	M
Phenanthrene	NA	NA
Phenol	22	RN
Potassium	NA	NA
Pyrene	1.1	RN
Selenium	0.050	M
Silver	0.18	RN
Sodium	NA	NA
Styrene	0.10	M
Sulfate	NA	NA
2,3,7,8-TCDD	0.000000030	M
TCDD Totals	0.000000030	M
TCDF Totals	0.00000030	M
1,1,1,2-Tetrachloroethane	0.00041	RC
1,1,2,2-Tetrachloroethane	0.000052	RC
Tetrachloroethene	0.0050	M
Thallium	0.0020	M
Toluene	1.0	M
Toxaphene	0.003	M

Screening Criteria - Waters (Continued)

Analyte	Screening Criteria mg/L	Source
2,4,6-Tribromophenol	NA	NA
1,2,4-Trichlorobenzene	0.070	M
1,1,1-Trichloroethane	0.20	M
1,1,2-Trichloroethane	0.0050	M
Trichloroethene	0.0050	M
Trichlorofluoromethane	1.3	RN
2,4,5-Trichlorophenol	NA	NA
2,4,6-Trichlorophenol	0.0061	RC
1,2,3-Trichloropropane	0.0000015	RC
Vanadium	0.26	RN
Vinyl Chloride	0.0020	M
Vinyl acetate	37	RN
m-Xylene	1.4	RN
o-Xylene	1.4	RN
p-Xylene	0.52	RN
Xylene (total)	10	M
Zinc	11	RN

Screening Criteria Source Codes

Screening Criteria Source	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations, carcinogenic level	RC
EPA Region III Risk-Based Concentrations, noncarcinogenic level	RN

Screening Criteria - Soils

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
Acenaphthene	4700	61000	RN
Acenaphthylene	NA	NA	NA
Acetone	7800	100000	RN
Aldrin	0.038	0.17	RC
Aluminum	NA	NA	NA
Anthracene	23000	310000	RN
Antimony	31	410	RN
Arsenic	23	310	RN
alpha-BHC	0.10	0.45	RC
beta-BHC	0.35	1.6	RC
delta-BHC	NA	NA	NA
gamma-BHC	0.49	2.2	RC
BTEX (total)	15	15	AK
Barium	5500	72000	RN
Benz(a)anthracene	0.88	3.9	RC
Benzene	0.50	0.50	AK
Benzo(a)pyrene	0.088	0.39	RC
Benzo(b)fluoranthene	0.88	3.9	RC
Benzo(g,h,i)perylene	NA	NA	NA
Benzo(k)fluoranthene	8.8	39	RC
Benzoic acid	310000	1000000	RN
Benzyl alcohol	23000	310000	RN
Beryllium	0.15	0.67	RC
Bromobenzene	NA	NA	NA
Bromodichloromethane	10	46	RC
Bromoform	81	360	RC
Bromomethane	110	1400	RN
4-Bromophenyl phenyl ether	4500	590000	RN
2-Butanone(MEK)	47000	610000	RN
Butylbenzylphthalate	16000	200000	RN
Cadmium	39	510	RN
Calcium	NA	NA	NA

Screening Criteria - Soils (Continued)

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
Carbon disulfide	7800	100000	RN
Carbon tetrachloride	4.9	22	RC
Chlordane	0.49	2.2	RC
4-Chloro-3-methylphenol	NA	NA	NA
4-Chloroaniline	310	4100	RN
Chlorobenzene	1600	20000	RN
Chloroethane	31000	410000	RN
bis(2-Chloroethoxy)methane	NA	NA	NA
2-Chloroethyl vinyl ether	2000	26000	RN
bis(2-Chloroethyl)ether	0.58	2.6	RN
Chloroform	100	470	RC
1-Chlorohexane	NA	NA	NA
bis(2-Chloroisopropyl)ether	9.1	41	RC
Chloromethane	49	220	RC
2-Chloronaphthalene	6300	82000	RN
2-Chlorophenol	390	5100	RN
4-Chlorophenyl phenyl ether	NA	NA	NA
Chromium	390	1000000	RN
Chrysene	88	390	RC
Cobalt	4700	61000	RN
Copper	2900	38000	RN
4,4'-DDD	2.7	12	RC
4,4'-DDE	1.9	8.4	RC
4,4'-DDT	1.9	8.4	RC
Di-n-octylphthalate	1600	20000	RN
Dibenz(a,h)anthracene	0.088	0.39	RC
Dibenzofuran	NA	NA	NA
Dibromochloromethane	7.6	34	RC
Dibromomethane	NA	NA	NA
Dibutyl phthalate	7800	100000	RN
1,2-Dichlorobenzene	7000	92000	RN
1,3-Dichlorobenzene	7000	91000	RN
1,4-Dichlorobenzene	27	120	RC

Screening Criteria - Soils (Continued)

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
3,3'-Dichlorobenzidine	1.4	6.4	RC
1,1-Dichloroethane	7800	100000	RN
1,2-Dichloroethane	7.0	31	RC
1,1-Dichloroethene	1.1	4.8	RC
cis-1,2-Dichloroethene	780	10000	RN
trans-1,2-Dichloroethene	1600	20000	RN
2,4-Dichlorophenol	230	3100	RN
1,2-Dichloropropane	9.4	42	RC
cis-1,3-Dichloropropene	3.7	16	RC
trans-1,3-Dichloropropene	3.7	16	RC
Dieldrin	0.040	0.18	RC
Diesel Range Organics	200	200	AK
Diethylphthalate	63000	820000	RN
2,4-Dimethylphenol	1600	20000	RN
Dimethylphthalate	780000	1000000	RN
4,6-Dinitro-2-methylphenol	NA	NA	NA
2,4-Dinitrophenol	160	2000	RN
2,4-Dinitrotoluene	160	2000	RN
2,6-Dinitrotoluene	78	1000	RN
Diphenylamine/N-NitrosoDPA	2000	26000	RN
Endosulfan I	470	6100	RN
Endosulfan II	470	6100	RN
Endosulfan sulfate	470	6100	RN
Endrin	23	310	RN
Endrin aldehyde	23	310	RN
Ethylbenzene	7800	100000	RN
bis(2-Ethylhexyl)phthalate	46	200	RC
Fluoranthene	3100	41000	RN
Fluorene	3100	41000	RN
Gasoline Range Organics	100	100	AK
Heptachlor	0.14	0.64	RC
Heptachlor epoxide	0.070	0.31	RC
Hexachlorobenzene	0.40	1.8	RC

Screening Criteria - Soils (Continued)

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
Hexachlorobutadiene	8.2	37	RC
Hexachlorocyclopentadiene	550	7200	RN
Hexachloroethane	46	200	RC
2-Hexanone	NA	NA	NA
HpCDD Totals	0.00041	0.0018	RC
HpCDF Totals	0.00041	0.0018	RC
HpCDF Totals	0.00041	0.0018	RC
HxCDD Totals	0.000041	0.00018	RC
HxCDF Totals	0.000041	0.00018	RC
Indeno(1,2,3-cd)pyrene	0.88	3.9	RC
Iron	NA	NA	NA
Isophorone	670	3000	RC
Lead	400	400	EL
Magnesium	NA	NA	NA
Manganese	390	5100	RN
Mercury	23	310	RN
Methoxychlor	390	5100	RN
4-Methyl-2-Pentanone(MIBK)	6300	82000	RN
Methylene chloride	85	380	RC
2-Methylnaphthalene	NA	NA	NA
3-Methylphenol	3900	51000	RN
2-Methylphenol(o-cresol)	3900	51000	RN
4-Methylphenol(p-cresol)	390	5100	RN
Molybdenum	390	5100	RN
N-Nitrosodiphenylamine	130	580	RC
N-Nitrosodipropylamine	0.091	0.41	RC
Naphthalene	3100	41000	RN
Nickel	1600	20000	RN
2-Nitroaniline	4.7	61	RN
3-Nitroaniline	230	3100	RN
4-Nitroaniline	230	3100	RN
Nitrobenzene	39	510	RN
2-Nitrophenol	NA	NA	NA

Screening Criteria - Soils (Continued)

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
4-Nitrophenol	4800	63000	RN
OCDD	0.0041	0.018	RC
OCDF	0.0041	0.018	RC
PCB-1016	5.5	72	RN
PCB-1221	0.083	0.37	RC
PCB-1232	0.083	0.37	RC
PCB-1242	0.083	0.37	RC
PCB-1248	0.083	0.37	RC
PCB-1248	0.083	0.37	RC
PCB-1254	0.083	0.37	RC
PCB-1260	0.083	0.37	RC
PeCDD Totals	0.0000082	0.000036	RC
PeCDF Totals	0.0000082	0.000036	RC
Pentachlorophenol	5.3	24	RC
Phenanthrene	NA	NA	NA
Phenol	47000	610000	RN
Potassium	NA	NA	NA
Pyrene	2300	31000	RN
Selenium	390	5100	RN
Silver	390	5100	RN
Sodium	NA	NA	NA
Styrene	16000	200000	RN
2,3,7,8-TCDD	0.0000041	0.000018	RC
TCDD Totals	0.0000041	0.000018	RC
TCDF Totals	0.000041	0.00018	RC
1,1,1,2-Tetrachloroethane	25	110	RC
1,1,2,2-Tetrachloroethane	3.2	14	RC
Tetrachloroethene	12	55	RC
Thallium	6.3	82	RN
Toluene	16000	200000	RN
Toxaphene	0.58	2.6	RC
1,2,4-Trichlorobenzene	780	10000	RN
1,1,1-Trichloroethane	7000	92000	RN

Screening Criteria - Soils (Continued)

Analyte	Residential Screening Criteria mg/kg	Industrial Screening Criteria mg/kg	Source
1,1,2-Trichloroethane	11	50	RC
Trichloroethene	58	260	RC
Trichlorofluoromethane	23000	310000	RN
2,4,5-Trichlorophenol	7800	100000	RN
2,4,6-Trichlorophenol	58	260	RC
1,2,3-Trichloropropane	0.091	0.41	RC
Vanadium	550	7200	RN
Vinyl Chloride	0.34	1.5	RC
Vinyl acetate	78000	1000000	RN
m-Xylene	160000	1000000	RN
o-Xylene	160000	1000000	RN
Xylene (total)	160000	1000000	RN
Zinc	23000	310000	RN

Screening Criteria Source Codes

Screening Criteria Source	Code
State of Alaska Cleanup Levels	AK
EPA Lead Based-Risk Criteria	EL
EPA Region III Risk-Based Concentrations, carcinogenic level	RC
EPA Region III Risk-Based Concentrations, noncarcinogenic level	RN

APPENDIX D

Statistical Discussion

INTRODUCTION

The analysis for the Remedial Investigation (RI) included a statistical comparison of chemical data from the sites at Galena Airport and Campion AFS to data from unaffected areas (background). Individual concentrations from the affected areas were compared to an upper limit calculated from background concentrations. This upper limit is called an upper tolerance limit (UTL). Section 1 of this appendix presents an explanation of UTLs and their use in this RI. Section 2 discusses the calculation of UTLs.

1.0 Description of Upper Tolerance Limits for Background

Two types of statistical comparisons may be used to compare results from different sample populations. One approach involves means comparisons which are used to compare the *average* measured background concentration to a corresponding *average* measured concentration for an affected area. This type of test is referred to as a test of central tendency. An alternate approach involves comparing *individual* results from each affected area to calculated upper limits for background concentrations. This second type of comparison is referred to as an extreme value test. Extreme value tests were used to identify potentially contaminated areas for the RI.

Extreme value tests require estimating the upper extreme of a given population (in this case background concentrations). When the distribution of background data appear to follow a known distribution (for example, normal or lognormal), the known characteristics of the distribution can be used to estimate the concentration below which a given proportion of the data are expected to fall (this proportion is described as the *coverage*). Based on these characteristics, parametric UTLs can be calculated as the upper confidence limit for given coverage level. In this RI, parametric UTLs represent the upper 95% confidence limit for 95% coverage. That is, one can be 95% confident that 95% of the background concentrations for

the analyte of interest will fall below the UTL. For data that do not follow a known distribution, nonparametric UTLs are calculated. At the 95% confidence level, the coverage provided by a nonparametric UTL generally is less than 95%. Although the nonparametric UTL is chosen to maximize the coverage, 95% coverage often is not achievable given the sample size.

When the coverage is high (95% or greater), there is a relatively small chance, on the order of 1 in 20, that a sample taken from an uncontaminated area will have an inorganic concentration greater than the UTL. When individual sample results are compared to UTLs, they are interpreted to indicate the presence of potential contamination when they exceed the UTLs.

2.0 Calculation of Background UTLs

UTLs were calculated for the background data so that individual site results could be compared to background levels. In calculating UTLs, the distribution of the data must be considered.

Normality tests were performed on the data and the logs of the data using the Shapiro Wilk test (Gilbert, 1987; Shapiro and Wilk, 1965). UTLs were calculated for background and upgradient data sets that were normally distributed using the following formula for normal distributions:

$$UTL = \bar{x} + (K \times s)$$

where x is the estimated sample mean, K is the tolerance factor, and s is the estimated standard deviation. For data sets that were lognormally distributed, the same formula as provided above was used, with the logs of the data used in all calculations. The exponent of the result was

taken to arrive at the lognormal UTL. Normal and lognormal UTLs were calculated for the 95th percentile (i.e., a coverage of 95%) with 95% confidence.

For background data sets that were not normally or lognormally distributed, nonparametric UTLs were estimated as the maximum background concentration. The coverage for non-parametric UTLs is a function of the sample size and was often less than the coverage of 95% used for the parametric (normal or lognormal) UTLs.

For background data sets where fewer than ten percent of the concentrations were measurable (measurable concentrations are J-flagged values or concentrations above the detection limit), the calculation of a UTL was inappropriate. For those cases, two times the maximum detection limit was used as the level to which all individual site concentrations should be compared. Note that no statements of degree of confidence or coverage provided can be made in these cases.

Tables D-1 and D-2 present the UTLs for groundwater, surface water, surface soil and subsurface soil background samples collected from the Galena Ambient Location and for surface soil background samples collected from the Campion Ambient Location.

Table D-1
Groundwater and Surface Water Background Summary Statistics

Matrix	Site	Method	Analyte	Min	Max	Mean	N	Upper Tolerance Limit	Units	Test Type	Coverage (%)
GW	Galena	SW6010	Aluminum	-0.032	0.100	0.042	6	0.241	mg/L	Normal	95.00
GW	Galena	SW6010	Antimony	0.003	0.050	0.032	6	0.100	mg/L	Normal	95.00
GW	Galena	SW7060	Arsenic	-0.005	0.019	0.004	8	0.027	mg/L	Normal	95.00
GW	Galena	SW6010	Barium	0.210	0.537	0.374	6	0.893	mg/L	Normal	95.00
GW	Galena	SW6010	Beryllium	-0.002	0.001	0.000	6	0.005	mg/L	Normal	95.00
GW	Galena	SW6010	Cadmium	-0.000	0.003	0.001	6	0.006	mg/L	Normal	95.00
GW	Galena	SW6010	Calcium	160.000	326.000	231.333	6	498.563	mg/L	Normal	95.00
GW	Galena	SW6010	Chromium	-0.001	0.005	0.003	6	0.011	mg/L	Normal	95.00
GW	Galena	SW6010	Cobalt	-0.004	0.038	0.018	6	0.079	mg/L	Normal	95.00
GW	Galena	SW6010	Copper	0.003	0.010	0.006	6	0.019	mg/L	Normal	95.00
GW	Galena	SW6010	Iron	-0.003	18.000	4.980	6	30.662	mg/L	Normal	95.00
GW	Galena	SW7421	Lead	-0.047	0.016	-0.004	8	0.016	mg/L	Non-Parametric	68.77
GW	Galena	SW6010	Magnesium	27.000	73.600	47.450	6	125.328	mg/L	Normal	95.00
GW	Galena	SW6010	Manganese	0.027	23.100	10.367	6	45.351	mg/L	Normal	95.00
GW	Galena	SW7470	Mercury	0.000	0.000	0.000	4	0.001	mg/L	Normal	95.00
GW	Galena	SW6010	Molybdenum	-0.004	0.025	0.008	6	0.058	mg/L	Normal	95.00
GW	Galena	SW6010	Nickel	-0.004	0.102	0.036	6	0.179	mg/L	Normal	95.00
GW	Galena	SW6010	Potassium	4.600	7.300	5.920	6	10.312	mg/L	Normal	95.00
GW	Galena	SW7740	Selenium	-0.003	0.027	0.005	6	0.027	mg/L	Non-Parametric	60.70
GW	Galena	SW6010	Silver	-0.002	0.005	0.002	6	0.015	mg/L	Normal	95.00
GW	Galena	SW6010	Sodium	4.500	11.300	7.302	6	17.051	mg/L	Normal	95.00
GW	Galena	SW6010	Thallium	-0.101	0.050	-0.011	6	0.202	mg/L	Normal	95.00
GW	Galena	SW6010	Vanadium	-0.004	0.010	0.003	6	0.025	mg/L	Normal	95.00
GW	Galena	SW6010	Zinc	0.001	0.019	0.011	6	0.034	mg/L	Normal	95.00
SW	Galena	SW6010	Aluminum	0.100	0.100	0.100	4	0.400	mg/L	Twice Max DL	.
SW	Galena	SW6010	Antimony	0.050	0.050	0.050	4	0.200	mg/L	Twice Max DL	.
SW	Galena	SW7060	Arsenic	0.002	0.002	0.002	4	0.008	mg/L	Twice Max DL	.
SW	Galena	SW6010	Barium	0.057	0.086	0.066	4	0.086	mg/L	Non-Parametric	47.29
SW	Galena	SW6010	Beryllium	0.001	0.001	0.001	4	0.004	mg/L	Twice Max DL	.
SW	Galena	SW6010	Cadmium	0.003	0.003	0.003	4	0.010	mg/L	Twice Max DL	.
SW	Galena	SW6010	Calcium	33.000	45.000	37.000	4	74.805	mg/L	Lognormal	95.00
SW	Galena	SW6010	Chromium	0.005	0.005	0.005	4	0.020	mg/L	Twice Max DL	.
SW	Galena	SW6010	Cobalt	0.005	0.005	0.005	4	0.020	mg/L	Twice Max DL	.
SW	Galena	SW6010	Copper	0.010	0.020	0.013	4	0.020	mg/L	Non-Parametric	47.29
SW	Galena	SW6010	Iron	0.330	1.000	0.565	4	5.890	mg/L	Lognormal	95.00
SW	Galena	SW7421	Lead	0.002	0.010	0.005	4	0.025	mg/L	Normal	95.00
SW	Galena	SW6010	Magnesium	6.500	7.800	6.875	4	7.800	mg/L	Non-Parametric	47.29
SW	Galena	SW6010	Manganese	0.050	0.160	0.096	4	1.092	mg/L	Lognormal	95.00
SW	Galena	SW7470	Mercury	0.000	0.000	0.000	4	0.000	mg/L	Twice Max DL	.
SW	Galena	SW6010	Molybdenum	0.025	0.025	0.025	4	0.100	mg/L	Twice Max DL	.
SW	Galena	SW6010	Nickel	0.010	0.010	0.010	4	0.040	mg/L	Twice Max DL	.
SW	Galena	SW6010	Potassium	3.800	4.900	4.225	4	7.328	mg/L	Lognormal	95.00
SW	Galena	SW7740	Selenium	0.003	0.003	0.003	4	0.010	mg/L	Twice Max DL	.
SW	Galena	SW6010	Silver	0.005	0.005	0.005	4	0.020	mg/L	Twice Max DL	.
SW	Galena	SW6010	Sodium	1.900	2.700	2.150	4	2.700	mg/L	Non-Parametric	47.29
SW	Galena	SW6010	Thallium	0.050	0.050	0.050	4	0.200	mg/L	Twice Max DL	.
SW	Galena	SW6010	Vanadium	0.010	0.010	0.010	4	0.040	mg/L	Twice Max DL	.
SW	Galena	SW6010	Zinc	0.010	0.039	0.017	4	0.039	mg/L	Non-Parametric	47.29

Table D-2
Surface and Subsurface Soil Background Summary Statistics

Matrix	Site	Method	Analyte	Min	Max	Mean	N	Upper Tolerance Limit	Units	Test Type	Coverage (%)
SB	Galena	SW6010	Aluminum	10000.00	16000.00	13250.00	4	26112.50	mg/kg	Normal	95.00
SB	Galena	SW6010	Antimony	6.00	8.00	6.88	4	32.00	mg/kg	Twice Max DL	.
SB	Galena	SW7060	Arsenic	11.00	14.00	12.25	4	20.45	mg/kg	Lognormal	95.00
SB	Galena	SW6010	Barium	180.00	240.00	217.50	4	352.81	mg/kg	Normal	95.00
SB	Galena	SW6010	Beryllium	0.15	0.38	0.26	4	0.88	mg/kg	Normal	95.00
SB	Galena	SW6010	Cadmium	0.30	0.39	0.34	4	1.56	mg/kg	Twice Max DL	.
SB	Galena	SW6010	Calcium	11000.00	15000.00	13000.00	4	22393.44	mg/kg	Normal	95.00
SB	Galena	SW6010	Chromium	23.00	32.00	28.25	4	48.12	mg/kg	Normal	95.00
SB	Galena	SW6010	Cobalt	12.00	13.00	12.50	4	13.00	mg/kg	Non-Parametric	47.29
SB	Galena	SW6010	Copper	27.00	40.00	33.75	4	61.42	mg/kg	Normal	95.00
SB	Galena	SW6010	Iron	23000.00	28000.00	25750.00	4	36356.69	mg/kg	Normal	95.00
SB	Galena	SW7421	Lead	8.20	10.00	9.03	4	13.76	mg/kg	Lognormal	95.00
SB	Galena	SW6010	Magnesium	7300.00	8000.00	7775.00	4	9474.93	mg/kg	Normal	95.00
SB	Galena	SW6010	Manganese	400.00	430.00	412.50	4	481.82	mg/kg	Lognormal	95.00
SB	Galena	SW7471	Mercury	0.15	0.26	0.19	4	0.65	mg/kg	Lognormal	95.00
SB	Galena	SW6010	Molybdenum	3.00	3.90	3.41	4	15.60	mg/kg	Twice Max DL	.
SB	Galena	SW6010	Nickel	27.00	32.00	30.50	4	42.75	mg/kg	Normal	95.00
SB	Galena	SW6010	Potassium	1100.00	1600.00	1275.00	4	3145.48	mg/kg	Lognormal	95.00
SB	Galena	SW7740	Selenium	0.29	0.46	0.35	4	1.84	mg/kg	Twice Max DL	.
SB	Galena	SW6010	Silver	0.60	0.80	0.69	4	3.20	mg/kg	Twice Max DL	.
SB	Galena	SW6010	Sodium	330.00	500.00	405.00	4	976.36	mg/kg	Lognormal	95.00
SB	Galena	SW6010	Thallium	6.00	8.00	6.88	4	32.00	mg/kg	Twice Max DL	.
SB	Galena	SW6010	Vanadium	39.00	54.00	46.00	4	91.81	mg/kg	Lognormal	95.00
SB	Galena	SW6010	Zinc	67.00	92.00	81.75	4	137.38	mg/kg	Normal	95.00
SS	Campion	SW6010	Aluminum	2470.00	10900.00	7033.33	6	19562.04	mg/kg	Normal	95.00
SS	Campion	SW6010	Antimony	-18.00	-1.45	-5.55	6	25.20	mg/kg	Twice Max DL	.
SS	Campion	SW7060	Arsenic	2.64	14.90	7.23	6	69.29	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Barium	127.00	1940.00	484.67	6	1940.00	mg/kg	Non-Parametric	60.70
SS	Campion	SW6010	Beryllium	0.05	0.35	0.23	6	0.66	mg/kg	Normal	95.00
SS	Campion	SW6010	Cadmium	-0.07	1.68	0.40	6	3.74	mg/kg	Twice Max DL	.
SS	Campion	SW6010	Calcium	3490.00	29600.00	11845.00	6	208399.2	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Chromium	6.94	20.90	14.09	6	34.93	mg/kg	Normal	95.00
SS	Campion	SW6010	Cobalt	4.37	86.60	19.91	6	86.60	mg/kg	Non-Parametric	60.70
SS	Campion	SW6010	Copper	7.18	25.70	13.05	6	62.81	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Iron	10200.00	136000.00	35783.33	6	136000.0	mg/kg	Non-Parametric	60.70
SS	Campion	SW7421	Lead	1.17	9.65	6.06	6	16.73	mg/kg	Normal	95.00
SS	Campion	SW6010	Magnesium	1830.00	4640.00	3380.00	6	7597.45	mg/kg	Normal	95.00
SS	Campion	SW6010	Manganese	147.00	28100.00	5023.00	6	28100.00	mg/kg	Non-Parametric	60.70
SS	Campion	SW7471	Mercury	-0.06	0.04	-0.02	6	0.20	mg/kg	Twice Max DL	.
SS	Campion	SW6010	Molybdenum	0.25	5.85	1.56	6	44.32	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Nickel	10.50	29.80	19.38	6	85.16	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Potassium	177.00	1060.00	455.83	6	3343.49	mg/kg	Lognormal	95.00
SS	Campion	SW7740	Selenium	0.87	3.26	2.19	6	5.04	mg/kg	Normal	95.00
SS	Campion	SW6010	Silver	-1.05	-0.31	-0.52	6	2.38	mg/kg	Twice Max DL	.
SS	Campion	SW6010	Sodium	89.60	301.00	169.60	6	1068.98	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Thallium	-19.10	0.68	-3.38	6	90.40	mg/kg	Twice Max DL	.
SS	Campion	SW6010	Vanadium	13.80	40.70	26.78	6	121.99	mg/kg	Lognormal	95.00
SS	Campion	SW6010	Zinc	18.00	78.00	39.70	6	210.87	mg/kg	Lognormal	95.00
SS	Galena	SW6010	Aluminum	5400.00	14000.00	12057.14	7	14000.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Antimony	4.15	7.50	6.09	7	30.00	mg/kg	Twice Max DL	.
SS	Galena	SW7060	Arsenic	4.20	15.00	11.46	7	15.00	mg/kg	Non-Parametric	65.18

Table D-2
Surface and Subsurface Soil Background Summary Statistics

Matrix	Site	Method	Analyte	Min	Max	Mean	N	Upper Tolerance Limit	Units	Test Type	Coverage (%)
SS	Galena	SW6010	Barium	70.00	250.00	187.14	7	380.13	mg/kg	Normal	95.00
SS	Galena	SW6010	Beryllium	0.09	0.36	0.28	7	0.36	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Cadmium	0.21	0.37	0.31	7	1.48	mg/kg	Twice Max DL	.
SS	Galena	SW6010	Calcium	4300.00	15000.00	12328.57	7	15000.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Chromium	9.70	30.00	25.10	7	30.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Cobalt	7.00	14.00	11.86	7	14.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Copper	9.70	37.00	28.53	7	60.08	mg/kg	Normal	95.00
SS	Galena	SW6010	Iron	11000.00	27000.00	22714.29	7	27000.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW7421	Lead	2.70	11.00	7.80	7	17.15	mg/kg	Normal	95.00
SS	Galena	SW6010	Magnesium	2600.00	8700.00	7114.29	7	8700.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Manganese	200.00	540.00	405.71	7	766.96	mg/kg	Normal	95.00
SS	Galena	SW7471	Mercury	0.08	0.20	0.16	7	0.30	mg/kg	Normal	95.00
SS	Galena	SW6010	Molybdenum	2.10	3.70	3.06	7	14.80	mg/kg	Twice Max DL	.
SS	Galena	SW6010	Nickel	17.00	34.00	28.86	7	34.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Potassium	320.00	1600.00	1072.86	7	2378.52	mg/kg	Normal	95.00
SS	Galena	SW7740	Selenium	0.22	0.37	0.30	7	1.48	mg/kg	Twice Max DL	.
SS	Galena	SW6010	Silver	0.42	0.75	0.61	7	3.00	mg/kg	Twice Max DL	.
SS	Galena	SW6010	Sodium	41.50	470.00	378.79	7	470.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Thallium	4.15	7.50	6.09	7	30.00	mg/kg	Twice Max DL	.
SS	Galena	SW6010	Vanadium	20.00	48.00	41.29	7	48.00	mg/kg	Non-Parametric	65.18
SS	Galena	SW6010	Zinc	27.00	82.00	67.86	7	82.00	mg/kg	Non-Parametric	65.18

APPENDIX E

Field Documents

1992 Drilling Logs

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 01-MW-01

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 60.00 START DATE 8/3/92 FINISH DATE 8/3/92
GEOLOGIST Paul A. Coplen APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) Fire Training Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Silt : olive gray (5Y 3/2), fine grained, soft, low plasticity, slightly moist; very sandy silt. (ML)		143.20	Logged from cuttings, O'-5'.
						140	
5	X	3/1/3/3	100	Sandy Silt : moderate olive brown (5Y 4/4), very fine grained, very soft sand, low plasticity, moist; organic matter in core. (ML)			BZ PID = 0 ppm. Headspace = 3.0 ppm.
						135	
10	X	1/0/0/0		Sand : light olive gray (5Y 5/2), fine grained, poorly graded, round, wet. (SP) Sand : as above, fine to medium grained; organic fragments, sand grains increasing in size with depth. (SP)			Sand grains appear to stick to Splt Spn when deconning. Core temp = 8 C. Foamy soaplike substance on end of E-line when checking water ^C level. BZ PID = 0 ppm, cuttings = 0.0.
						130	
15	X	1/2/3	100	Silty Sand : olive gray (5Y 3/2), fine grained, poorly graded, round, soft, wet. (SM) Silty Sand : light olive gray (5Y 5/2), very fine grained, poorly graded, very soft; oxidation laminae < 2mm, blackish laminae < 10mm. (SM)			Slow drilling, BZ PID = 0 ppm, cuttings = 1-4 ppm.
						125	
20	X	1/0/0/0	100	Sand : olive gray (5Y 3/2), fine grained, poorly graded, round, wet; few medium grains sand dispersed throughout. (SP)			BZ PID = 0 ppm, cuttings = 1-3 ppm.
						120	
25	X	1/1/0/0	NR	Sand : as above.			No recovery, sample fell out of Splt Spn. 2.5' Heave in augers when try to resume drilling.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 01-MW-01

PROJECT: Galena Stage 3 RI/FS | LOCATION: Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30				**Sand** : fine to medium grained.			Logged from cuttings.
						110	
35				**Sand** : medium grained; many large sand grains and small gravels on augers as they are pulled, increase with depth.			
						105	
40							
						100	
45							
						95	
50							
						90	
55							
						85	
60				End of Borehole at 60' BGL.			

RADIAN CORPORATION

Monitor Well #: 01-MW-02

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	30.00	START DATE	8/6/92
FINISH DATE	8/6/92		
GEOLOGIST	Paul A. Coplen	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Fire Training Area		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Sandy Silt** (SM)		143.10	Logged from cuttings, 0'-5'. BH PID = 0 ppm, cuttings = 0.0.
						140	
5	X	2/1/1/2	100	**Silty Sand**: light olive gray (5Y 3/2), fine grained, poorly graded, moist; very silty, layer of silt with oxidation stains and organic material from 6.0' to 6.5', increase sand content with depth. (SM)			BZ PID = 0 ppm, cuttings = 0.0. No odor, no OVM hit.
						135	
10	X	1/1/1	100	**Silt**: olive gray (5Y 3/2), wet; silts laminated with fine and medium grained sand 1-3mm thick laminae, dusky yellow (5Y 6/4). (ML)			BZ PID = 0 ppm, cuttings = 0.0.
						130	
15	X	1/1/1	100	**Silty Sand**: olive gray (5Y 3/2), fine grained, poorly graded, round, wet. (SM) **Silt**: no lith-description; few gravel, = < 10mm, sub-round. (ML)			
						125	
20	X	1/2/3	100	**Sand**: olive gray (5Y 3/2), fine grained, poorly graded, round, wet. (SP) **Silt**: no lith-description; 3" silt laminae. (ML)			BZ PID = 0 ppm.
						120	
25	X	40/50+	100	**Sand**: light olive gray (5Y 5/2), fine to medium grained, well graded, round, wet; encountered permafrost. (SW)			BZ PID = 0 ppm, cuttings = 0.0. Permafrost.
	X	4/4/3/3	100	**Sand**: as above. (SW)			BZ PID = 0 ppm, cuttings = 0.0. Gravel seen on lead auger when pulled from

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

Monitor Well #: 01-MW-02

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
	X						hole.
30				End of Borehole at 30' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 01-SB-01

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	9.50	START DATE	8/8/92
FINISH DATE	8/8/92		
GEOLOGIST	R. Petrossian	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Fire Training Area		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						143.20	
	X	3/3/3/4	60	Gravelly Silt : pale red (5R 6/2), loose, non-plastic, dry; some roots and slightly layered. (ML)			Headspace = 10.2 ppm.
				Sandy Silt : grayish brown (5YR 3/2). (ML)		140	
5	X	4/3/3/3	60	Gravelly Sand : brownish gray (5YR 4/1), very fine grained, poorly graded, well rounded, moist; carbonaceous material, dry intervals, slightly organish staining, woody plant remains. (SP)			Headspace = 0 ppm.
	X	3/2/3/3		Silty Sand : dark yellow brown (10YR 4/2), very fine grained, poorly graded, well rounded, moist; slightly organish staining. (SM)		135	Headspace = 0 ppm.
				End of Borehole at 9.5' BGL.			

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 01-SB-02

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	9.50	START DATE	8/8/92
FINISH DATE	8/8/92		
GEOLOGIST	R. Petrossian	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Fire Training Area		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						142.70	Headspace = 117 ppm, from split spoon cuttings (grab sample).
	X	2/2/2/2	50	Sandy Silt : olive gray (5Y 4/1), fine grained, poorly graded, round, soft, non-plastic, dry; slightly compacted, some dark black blotches of staining. (ML)		140	Headspace = 201 ppm.
5	X		75	Silty Sand : light olive gray (5Y 6/1), fine grained, poorly graded, round, soft, moist; fine at top to coarse at bottom, some rootlets. (SM)			Headspace = 433 ppm.
	X	2/2/2/3	100	Silty Sand : olive gray (5Y 3/2), fine grained, poorly graded, round, firm, moist; more rootlets, plant remains, strong odor, few pebbles. (SM)		135	Headspace = 730 ppm.
				End of Borehole at 9.5' BGL.			

****NOTES****

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

Soil Boring #: 01-SB-02

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 9.50 START DATE: FINISH DATE:
GEOLOGIST: R. Petrossian APPROVED BY: S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: Rod & Ricky
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Fire Training Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						142.70	117 ppm from split spoon cuttings (grab sample).
	X	2/2/2/2	50	**Sandy Silt**: olive gray (5Y 4/1), fine grained, poorly graded, round, soft, non-plastic, dry; slightly compacted, some dark black blotches of staining.		140	201 ppm.
5	X		75	**Silty Sand**: light olive gray (5Y 6/1), fine grained, poorly graded, round, soft, non-plastic, moist; fine at top to coarse at bottom, some rootlets.			433 ppm.
	X	2/2/2/3	100	**Silty Sand**: olive gray (5Y 3/2), fine grained, poorly graded, round, firm, non-plastic, moist; more rootlets, plant remains, strong odor, few pebbles.		135	730 ppm.
							Total Depth at 9.5' BGL.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Monitor Well #: **04-MW-02**

Page 1 of 1

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 21.50 START DATE: FINISH DATE:
GEOLOGIST: R. Petrossian APPROVED BY: S.T. Godard R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Ambient Site

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Silty Gravel**: no lithologic description.		147.40	Very gravelly at surface.
						145	
5	X	1/1/1	70	**Sandy Silt**: brown, fine grained, poorly graded, sub-angular to sub-round, soft, low plasticity, moist; abundant organics, woodchips, and roots. (ML)			Headspace = 7.1 ppm.
						140	
10	X	1/1/1	100	**Silty Sand**: olive gray, fine grained, poorly graded, sub-round to sub-angular, soft, moist; coarsening downward, organics, rootlets, slight organish-brown motling in fine grained sand. (SM)			
						135	Water level at 13.8' BGL.
15	X	2/1/1	100	**Gravelly Sand**: tan brown, medium grained, well graded, sub-angular to angular, soft, wet; lots of quartz pebbles, some larger pebbles, some black organic. (SW)			
						130	
20	X	7/2/4	25	**Gravelly Sand**: coarse grained, well graded, sub-angular to sub-round, soft, wet; 50% mafis, 50% sialic. (SW)			OVM = 0.0 ppm. Permafrost from 20.5' to 21.5'.
				End of Borehole at 21.5' BGL.			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 04-MW-03

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 25.50
START DATE:
FINISH DATE:
GEOLOGIST: R. Petrossian
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Ambient Site

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						146.00	
						145	
5	X	1/2/3	100	Silt: olive gray (5Y 4/1), soft, non-plastic, dry; intervals of horizontal woodchips - 1/2" long and smaller with vertical rootlets. (ML)		140	Very soft.
10	X	2/2/3	100	Sandy Silt: olive gray (5Y 4/1), fine grained, poorly graded, soft, non-plastic, wet; 50% mafic, 50% micaceous silicate. (ML)		135	Water level at 10.7' BGL.
				Silty Sand: dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-angular to sub-round, very soft, non-plastic, wet. (SM)			
15	X	7/6/9	100	Sand: dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-angular, very soft, wet; coarsening downward, more silica, yellowish colored grains. (SP)		130	
20	X	2/4/3	100	Silty Sand: olive gray, fine grained, poorly graded, soft, wet. (SM)		125	
				Sand: dark yellow brown, medium grained, poorly graded, sub-round, soft, wet. (SP)			
25	X	12/16/19	70	Silty Sand: olive gray, fine grained, poorly graded, sub-round, hard, frozen; micaceous flakes, intervals of woodchips. (SM)			Hit permafrost.
				End of Borehole at 25.5' BGL.			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 60.00 — START DATE: 7/21/92 — FINISH DATE: 7/21/92
GEOLOGIST: B. J. Coel — APPROVED BY: S.T. Godard — R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling — DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon — EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Silt: dark yellowish brown (10YR 4/2), very fine grained, poorly graded, soft, non-plastic, dry. (ML)		148.50	Logged from cuttings 0'-5'.
						145	
5	X	1/3/3	100	Sandy Silt: dark yellowish brown (10YR 4/2), very fine grained, poorly graded, soft, non-plastic, moist; some rounded gravel. (ML)			BH PID = 1.3 ppm, BZ PID = 1.3 ppm.
						140	
10	X	1/1/3/3	100	Sandy Silt: dark yellowish brown (10YR 4/2), very fine grained, poorly graded, soft, non-plastic, moist; trace clay with iron staining, trace woodchips. (ML)			Sample 10'-12', 05-MW-01-02. BH & BZ PID = 0 ppm. Headspace = 33.3 ppm.
						135	Water level at 13.2' BGL.
15	X	2/1/3	100	Sand: dark yellowish brown (10YR 4/2), medium grained, poorly graded, sub-round, non-plastic, moist; approx. 5% coarse sand. (SP)			BH PID = 2.7 ppm, BZ PID = 1.3 ppm.
						130	
20	X	2/2/2	100	Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, non-plastic, moist. (SW)			Core temp = 14 C, sieve sample.
						125	
25	X	2/2/3	NR	Sand: dark yellowish brown (10YR, 4/2), fine to medium grained, wet. (SP)			BH PID = 1 ppm, BZ PID = 0 ppm, logged from cuttings. 3' Heave, no recovery.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						120	
30	X	8/10/3	NR				BH PID = 1 ppm, BZ PID = 0 ppm. 4' Heave, no recovery.
						115	
35	X	6/10/10	NR				BH & BZ PID = 0 ppm. 6' Heave, no recovery.
						110	
40	X		NR				BH & BZ PID = 0 ppm. 8' Heave, no sample taken due to heave. Drilled to 60', no more samples taken.
						105	
45							
						100	
50							
						95	
55							
						90	
60				End of Borehole at 60' BGL.			

RADIAN CORPORATION

Monitor Well #: 05-MW-02

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 53.00 — START DATE: 7/23/92 — FINISH DATE: 7/23/92
GEOLOGIST: B. J. Coel — APPROVED BY: S.T. Godard — R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling — DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon — EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Gravelly Sand**: dark yellowish brown (10YR 4/2), fine grained, well graded, sub-round, dry. (SW)		147.40	Logged from cuttings, represents 0'-5'. Looks like fill.
						145	
5							
	7-9	5/3/3/3	87.5	**Sandy Silt**: dark yellowish brown (10YR 4/2), very fine grained, poorly graded, soft, non-plastic, moist. (ML)		140	BH PID = 1 ppm, BZ PID = 1 ppm. Sample 7'-9', 05-MW-02-02.
				Sand: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-angular, moist. (SP)			Headspace = 11.3 ppm.
10							
						135	Water level at 12.4' BGL.
15		2/2/2	100	**Sand**: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-angular, moist; approx. 10% coarse sand, trace gravel. (SP)			BH PID = 3 ppm, BZ PID = 1 ppm.
						130	
20		3/1/1	100	**Sand**: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-angular, wet; trace medium sand, trace woodchips. (SP)			BH & BZ PID = 0 ppm.
						125	
25		2/2/2	100	**Sand**: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-angular, wet; trace medium sand. (SP)			BZ PID = 0 ppm, BH PID = missed.
						120	

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	4/6/6	100	**Sand** : dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-angular, wet; trace medium and coarse sand. (SP)			BH PID = 1 ppm, BZ PID = 0 ppm. Slight heaving.
						115	
35	X	7/14/12	100	**Sand** : dark yellowish brown (10YR 4/2), medium grained, poorly graded, sub-angular, wet; trace medium and coarse sand, trace woodchips. (SP) **Sand** : dark yellowish brown (10YR 4/2), coarse grained, well graded, sub-angular, wet; trace gravel, trace woodchips, approx. 20% medium sand. (SP)			BH PID = 1 ppm, BZ PID = 0 ppm, core temp = 15 C.
						110	
40	X	3/5/6	83	**Sand** : olive gray (5Y 4/1), coarse grained, well graded, sub-round, wet; trace gravel, approx. 20% medium and fine sand. (SP)			BH PID = 1 ppm, BZ PID = 0 ppm.
						105	
45	X		NR				BH & BZ PID = 0 ppm. No recovery. Drilled to 53' and installed well at 51'.
						100	
50							
						95	
				End of Borehole at 53' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 05-MW-03

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 60.00 START DATE 7/22/92 FINISH DATE 7/22/92
GEOLOGIST GJC APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand : dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, moist; fine to coarse gravel. (SP)		145.80 / 145	Logged from cuttings 0'-4'.
5	X	1/1/1	100	Sandy Silt : brownish gray (5YR 4/1), soft, non-plastic, moist; abundant woodchips, organics. (ML)		140	BH & BZ PID = 0 ppm.
10	X	2/2/35	100	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-round, moist; trace fine gravel. (SP)		135	BH & BZ PID = 0 ppm. Sample 8'-12', 05-MW-03-02, duplicate 05-DS-02.
							Approx. water depth at 12.3' BGL.
15	X	2/3/4	100	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-round, wet. (SP)		130	BH & BZ PID = 0 ppm.
20	X	4/4/4		Gravelly Sand : olive gray (5Y 4/1), fine to coarse grained, well graded, sub-round to round; minor fine to coarse gravel, slight hydrocarbon odor. (SW)		125	BH PID = 12 ppm, BZ PID = 0 ppm. Sieve sample.
25	X	2/3/2	100	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-round, wet; medium to coarse grain interbed from 24.3' to 24.5', slight hydrocarbon odor. (SP)		120	BH PID = 65 ppm, BZ PID = 0 ppm. Sieve sample, 2' heave.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	6/4/3	NR			115	BH PID = 240 ppm, BZ PID = 0 ppm.
35	X	21/16/14	67	Gravelly Sand : olive gray (5Y 4/1), fine to medium grained, poorly graded, sub-round, wet; sparse fine gravels, trace coarse gravel. (SP)		110	BH PID = 660 ppm, BZ PID = 2 - 36 ppm. High blow counts due to heave, 6' heave. No sampling for lithology from 35.5' to TD. Heaving sands.
40						105	
45						100	
50						95	
55						90	BH PID = 569 ppm, BZ PID = 0 ppm.
60				End of Borehole at 60' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 05-MW-04

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 50.00 START DATE: 7/30/92 FINISH DATE: 7/30/92
GEOLOGIST: B. J. Coel APPROVED BY: S.T. Godard R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Silt : olive black (5Y 2/1), very fine grained, poorly graded, soft, medium plasticity, moist. (MH)		143.60	Logged from cuttings, 0'-8'. Background PID = 1 ppm.
5						140	
	X	4/3/4/4	75	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, wet; trace coarse sand, strong hydrocarbon odor. (SP)		135	BH PID = 500 ppm, BZ PID = 3 ppm. Water level at 8.67' BGL. Sample 8'-10', 05-MW-04-02. Brass sleeves loaded incorrectly, no recovery in sleeves.
10						130	
15	X	1/1/2	100	Sand : olive gray (5Y 4/1), fine grained, well graded, sub-angular, wet; 10% coarse sand, trace gravel, strong hydrocarbon odor. (SP)		125	BH PID = 500 ppm, BZ PID = 3 ppm.
20	X	1/1/2	33	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, wet; strong hydrocarbon odor. (SP)		120	BH PID = 421 ppm, BZ PID = 3 ppm. 1.5' Heave, temp = 12 C. PID on cuttings = 750 ppm.
25	X	1/1/2		Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, wet; hydrocarbon odor. (SP)			BH PID = 625 ppm, BZ PID = <5 ppm. Temp = 10 C. PID on cuttings = 600 ppm.

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						115	
30	X	7/8/6		**Sand** : olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, wet; trace coarse sand, trace gravel, faint hydrocarbon odor. (SP)			BH PID = 330 ppm, BZ PID = 1 ppm. Temp = 9 C, 6' heave. Too much heave, quit sampling, installed well at 47'.
						110	
35							
						105	
40							
						100	
45							
						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

Monitor Well #: 05-MW-05

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 40.00
START DATE: 7/31/92
FINISH DATE: 7/31/92
GEOLOGIST: B. J. Coel
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Silt: olive black (5Y 2/1), very fine grained, poorly graded, soft, non-plastic, moist; hydrocarbon odor. (ML)		143.20	Logged from cuttings, 0'-5'. PID on cuttings = 44 ppm, BZ PID = 3 ppm.
						140	
5	X	3/2/12	100	Sandy Silt: olive black (5Y 2/1), very fine grained, poorly graded, soft, non-plastic, moist; lots of wood, strong hydrocarbon odor. (ML)			Headspace = 500 ppm. Sample 5'-7', 05-MW-05-02.
						135	
10	X	1/1/2	100	Sandy Silt: olive black (5Y 2/1), very fine grained, poorly graded, soft, non-plastic, wet. (ML)			Water level at 9.6' BGL. BH PID = 25 ppm, BZ PID = 0 ppm. Temp = 11 C.
				Sand: olive black (5Y 2/1), fine grained, poorly graded, sub-angular, wet. (SP)			
						130	PID on cuttings = 25 ppm.
15	X	2/2/3	83	Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, wet; approx. 1% medium sand concentrated in a 1 cm. wide layer at approx. 6', hydrocarbon odor, sheen on water. (SP)			BH PID = 696 ppm, BZ PID = 3 ppm. Temp = 9 C.
						125	
20	X	3/7/5	100	Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, wet; strong hydrocarbon odor, trace woodchips. (SP)			BH PID = high, BZ PID = 3 ppm. Temp = 9 C.
						120	
25	X	2/2/2	33	Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, wet; trace wood. (SP)			BH PID = 125 ppm, BZ PID = 3 ppm. 5' Heave, temp = 10 C, sample may be heave.
				Sand: olive gray (5Y 4/1), coarse grained, well graded, sub-round, wet. (SP)			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	9/10/8	100	**Sand**: olive gray (5Y 4/1), medium grained, well graded, sub-round, wet; 6" of heaved sand in sampler. (SP)			Benzene Drager tube reading = 0 in BZ. BH PID = 190 ppm, BZ PID = 3 ppm. 7' Heave, temp = 9 C.
				Sandy Gravel: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, wet; weak hydrocarbon odor. (GP)		110	
35	X	6/7/0	Trc.	**Sandy Gravel**: olive gray (5Y 4/1), fine grained, well graded, sub-round, wet; weak hydrocarbon odor, some coarse gravel and some coarse and medium sand. (GW)		105	BH PID = not taken, BZ PID = 3 ppm. 5' Heave, temp = 10 C, quit sampling due to heave.
40				End of Borehole at 40' BGL.			

RADIAN CORPORATION

Monitor Well #: 05-MW-06

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 50.00 START DATE 8/1/92 FINISH DATE 8/1/92
GEOLOGIST P. A. Coplen APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) POL Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Silt : olive gray (5Y 3/2), very fine grained, dry; increase sand with depth. (ML)		142.40	Logged from cuttings, 0'-7'. PID: cuttings = 1 ppm, BZ PID = 0 ppm.
						140	
5							
	X	3/2/3/3	100	Sand : olive gray (5Y 3/2), fine grained, poorly graded, sub-round, moist; silt laminae <4mm thick. (SP)		135	BH PID = 1 ppm, BZ PID = 0 ppm. Water level at 8.38' BGL. Headspace = 1.0 ppm.
10							
						130	
15	X	2/3/3	100	Sand : olive gray (5Y 3/2), fine to coarse grained, well graded, sub-round, wet; coarse sand at 15.5' with 10% gravel. (SW)			BH PID = 1 ppm, BZ PID = 0 ppm.
						125	
20	X	11/17/12	100	Sand : light olive gray (5Y 5/2), fine to coarse grained, well graded, wet; fine grades to coarse, 0.7' coarse grain sand in sampler. (SW)			BH PID = 1 ppm, BZ PID = 1 ppm. Temp = 15 C, 6" heave.
						120	
25	X	9/12/10	100	Sand : light olive gray (5Y 5/2), fine to medium grained, well graded, sub-round, wet; fine to medium grain sand with few coarse (<5%) grains. (SW)			BH PID = 1 ppm, headspace = 1 ppm. Temp = 9 C, 8"-10" heave. Logged from cuttings, drilled to 50' BGL.
						115	

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30						110	
35						105	
40				Gravelly Sand (SW)		100	Easy to drill, advancing @ 0.3 ft/min.
45						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

Soil Boring #: 05-SB-01

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 12.00
START DATE: 7/20/92
FINISH DATE: 7/20/92
GEOLOGIST: GJC
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): POL

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand : grayish brown (5YR 3/2), fine grained, poorly graded, sub-round, moist; common fine to coarse gravel, silty. (SP)		144.30	Logged from cuttings.
		2/3/3/4	75	Sandy Silt : grayish black (N2), soft, non-plastic, moist; hydrocarbon odor, hydrocarbon stained, minor woodchips. (ML)			BH PID = 62 ppm, BZ PID = 0 ppm. sample 2'-4', 05-SB-01-01, headspace = 672 ppm.
						140	
5		1/1/2/3	100	Sandy Silt grayish black (N2), soft, non-plastic, moist; hydrocarbon odor and hydrocarbon stained. (ML)			BH PID = 67 ppm, BZ PID = 0 ppm. Sample 5'-7', 05-SB-01-02, headspace = 562 ppm.
		2/3/2/2	100	Sand : olive black (5Y 2/1), fine grained, poorly graded, sub-round, moist; hydrocarbon odor. (SP)		135	BH PID = 55 ppm, BZ PID = 0 ppm. Sample 8'-10', 05-SB-01-03, headspace 232 ppm.
10		2/3/3/3	100	Sand : olive black (5Y 2/1), fine grained, poorly graded, sub-round, wet; hydrocarbon odor. (SP			BH PID = 62 ppm, BZ PID = 0 ppm. Split spoon sampler wet, no analytical sample collected.
				End of Borehole at 12' BGL.			

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 05-SB-02

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 12.00 START DATE 7/21/92 FINISH DATE 7/21/92
GEOLOGIST B. J. Coel APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) POL

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Sandy Silt**: dusky yellowish brown (10YR 2/2), very fine grained, poorly graded, soft, non-plastic, moist. (ML)		144.00	Logged from cuttings, 0' to 2'.
	X	3/3/3/3	75	**Sandy Silt**: dusky yellowish brown (10YR 2/2), very fine grained, poorly graded, soft, non-plastic, moist; trace woodchips. (ML)		140	BH PID = 158 ppm, BZ PID = 1 ppm. Sample 2'-4', 05-SB-02-01, headspace = 258 ppm.
5	X	2/1/1/1	100	**Sandy Silt**: olive brown (5Y 4/1), very fine grained, poorly graded, soft, non-plastic, moist; strong hydrocarbon odor. (ML)			BH PID = 148 ppm, BZ PID = 0 ppm. Sample 5'-7', 05-SB-02-02, headspace = 68 ppm. 4 ppm when split spoon opened.
	X	1/2/2/4	100	**Sandy Silt**: olive brown (5Y 4/1), very fine grained, poorly graded, soft, non-plastic, moist; strong hydrocarbon odor. (ML)		135	BH PID = 134 ppm, BZ PID = 1 ppm. Sample 8'-10', 05-SB-02-03, headspace = 48 ppm.
				Sand: olive brown (5Y 4/1), fine grained, poorly graded, sub-round, soft, non-plastic, moist. (SP)			Water level at 9.6' BGL.
10	X	1/2/4/4	100	**Gravelly Sand**: olive brown (5Y 4/1), fine grained, poorly graded, sub-round, non-plastic, wet; very strong hydrocarbon odor. (ML)			BH PID = 143 ppm, BZ PID = 4.1 ppm. Sample 10'-12', 05-SB-02-04, headspace = 63 ppm. Sending in sample due to heavy HC odor.
				End of Borehole at 12' BGL.			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 05-SB-03

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	12.00	START DATE	7/20/92	FINISH DATE	7/20/92
GEOLOGIST	GJC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish		
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell Trkrg		
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	POL				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand : grayish brown (5YR 3/2), fine grained, poorly graded, sub-round, moist; fine to coarse gravel, abundant silt. (SP)		146.30 / 145	Logged from cutting from 0'-3'. BH & BZ PID = 0 ppm.
	X	2/1/2/3	NR				Sampler shoe jammed, no recovery from 3'-5' BGL.
5	X	5/6/6/4	100	Sandy Silt : olive black (5Y 2/1), soft to fine, non-plastic, moist; abundant fines, minor woodchips, hydrocarbon odor. (ML)		140	BH PID = 42 ppm, BZ PID = 0.5 ppm. Sample 5'-7', duplicate 05-SB-03-01 & 05-DS-01. Headspace = 135 ppm.
	X	3/3/2/3	100	Sand : medium dark gray (N4), fine grained, poorly graded, sub-round, moist to wet; hydrocarbon odor, becoming wet at 9' BGL. (SP)			BH PID = 135 ppm, BZ PID = 0.5 ppm. Sample 7'-9', 05-SB-03-02, headspace = 152 ppm.
10	X	3/2/3/3	100	Sand : medium dark gray (N4), fine grained, poorly graded, sub-round, wet. (SP)		135	Water level at 10' BGL. BH PID = 127 ppm, BZ PID = 0.5 ppm.
				End of Borehole at 12' BGL.			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Monitor Well #: 06-MW-01

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS | LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 57.00 | START DATE: 7/18/92 | FINISH DATE: 7/18/92
GEOLOGIST: KLC, GJC | APPROVED BY: S.T. Godard | R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling | DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon | EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Waste Accumulation Area

Depth Below Surface (ft)	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0			Sandy Gravel: brownish black (5YR 2/1), fine grained, well graded, sub-round, dry; woodchips. (SP)	148.80	Logged from cuttings, background PID = 2 ppm.
5	2/3/4	67	Silty Sand: brownish black (5YR 2/1), very fine grained, well graded, sub-round, dry; woodchips, iron stain. (SM)	145	BH & BZ PID = 2 ppm. Lithologic sample only.
	6/2/2/2	100	Silty Sand: dark yellowish brown (10YR 4/2), very fine grained, well graded, dry; organics, micaceous, some gravel. (SM)	140	Headspace = 22 ppm, sample 8'-10', 06-MW-02-02. BH & BZ PID = 2 ppm.
10				135	
15	2/2/2	100	Silty Sand: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, wet. (SM)	130	BH & BZ PID = 2 ppm.
20	2/2/2	100	Silty Sand: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, wet. (SM)	125	BH PID = 148 ppm, BZ PID = 0 ppm. Sieve sample.
25	3/4/7	100	Silty Sand: dark yellowish brown (10YR 4/2), coarse, well graded, sub-round, wet; gravel interbeds, less silt. (SM)		BH PID = 10 ppm, BZ PID = 2 ppm, 2.5' heave.

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						120	
30	X	5/26/24	100	Gravelly Sand : dusky brown (5YR 2/2), coarse to fine grained, well graded, sub-round, wet; top coarse sand with gravel grading to fine sand with gravel. (SW)			BH & BZ PID = 2 ppm, 2.5' heave.
						115	
35	X	7/6/4	67	Silty Sand : dark yellowish brown (10YR 4/2), fine grained, poorly graded; short loose sample. (SM)			BH PID = 6 ppm, BZ PID = 2 ppm, 5.5' heave.
						110	
40	X	9/14/9	100	Sand : dark gray (N3), fine grained, poorly to well graded, sub-round, wet; very coarse to fine. (SP-SW)			BH PID = 10 ppm, BZ PID = 2 ppm, 5.5' heave.
						105	
45	X	10/11/10	NR				BH & BZ PID = 2 ppm, 7' heave.
						100	
50							
						95	
55							
				End of Borehole at 57' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 06-MW-02

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 55.00
START DATE: 7/17/92
FINISH DATE: 7/17/92
GEOLOGIST: KLC, GJC
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Waste Accumulation Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Gravelly Sand**: grayish brown (5YR 3/2), fine grained, well graded, sub-round, dry. (SW)		145.30	Logged from cuttings, 0'-3'.
	X	4/3/3/5	100	**Sandy Silt**: dusky brown (5Y 2/2), very fine grained, soft, non-plastic, moist. (ML)			BH & BZ PIDs = 1 ppm.
5						140	
10	X	1/2/2	100	**Silty Sand**: dusky brown (5YR 2/2), fine grained, poorly graded, sub-round, wet. (SM)		135	BH & BZ PIDs = 1 ppm. Water level at 10.2' BGL.
15	X	2/3/3	100	**Sand**: dusky brown (5YR 2/2), fine grained, poorly graded, sub-round, wet. (SP)		130	BH PID = 3 ppm, BZ PID = 1 ppm.
20	X	3/6/5	100	**Gravelly Sand**: dusky brown (5YR 2/2), fine grained, well graded, sub-round, wet; sand with interbedded gravels. (SW)		125	
25	X	3/7/11	100	**Gravelly Sand**: as above; gravel interbeds.		120	BH PID = 1 ppm, BZ PID = 0 ppm.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	1/2/3	100	**Sandy Gravel**: dusky brown (5YR 2/2), fine grained, well graded, sub-round, wet. (SW)		115	BH PID = 1 ppm, BZ PID = 0 ppm, 4' heave.
35	X	6/6/4	NR			110	7' Heave, no recovery, bottom of shoe filled with large gravel.
40	X	6/10/7	NR			105	10' Heave, no recovery, large gravel plugging sampler.
				Sand: grayish black (N2), fine to medium grained, poorly graded, sub-round, wet. (SP)			
45	X	5/6/4	33	**Sandy Gravel**: grayish black (N2), fine grained, poorly graded, sub-round, wet. (SP)		100	BH PID = 1 ppm, BZ PID = 0 ppm, 8' heave.
50						95	
55				End of Borehole at 55' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	50.00	START DATE	7/14/92
FINISH DATE	7/14/92		
GEOLOGIST	KLC, GJC	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Waste Accumulation Area		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, moist. (SW)		142.40	Logged from cuttings, 0'-4'.
						140	
5	X	7/8/8/ 9	100	Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, moist. (SW)			Sample 4'-6', 06-MW-03-02, duplicate, 06-DS-01.
	X	3/5	100	Sandy Silt: olive black (5Y 2/1), very fine grained, soft, non-plastic, moist; hydrocarbon odor. (ML)			BH PID = 3.5 ppm, BZ PID = 0 ppm. Headspace 4'-7' PID = 75 ppm.
						135	Water level at 7.7' BGL
10	X	1/2/3	100	Sand: olive gray (5Y 4/1), fine to medium grained, poorly graded, sub-round, wet. (SP)			BH & BZ PID = 0 ppm.
						130	
15	X	4/5/7	100	Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, wet. (SW)			BH & BZ PID = 0 ppm.
				Sandy Gravel: olive gray (5Y 4/1), fine grained, well graded, sub-round, wet. (GW)		125	
20	X	9/24/ 13	100	Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, wet; gravelly sand with thin interbeds of gravel. (SW)			BH PID = 1 ppm, BZ PID = 0 ppm.
						120	
25	X	10/24/ 12	100	Gravelly Sand: olive gray (5Y 4/1), medium grained, well graded, sub-round, wet. (SW)			Core temp = 11 C, sieve sample from 25'-26.5'.
				Sand: olive gray (5Y 4/1), coarse grained, well graded, sub-round, wet. (SW)		115	

****NOTES****

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	3/3/2	100	**Sand** : olive gray (5Y 4/1), coarse grained, well graded, sub-round, wet; larger coarser gravel. (SW)			BH & BZ PID = 0 ppm.
						110	
35	X	4/11/13	100	**Gravelly Sand** : olive gray (5Y 4/1), coarse, well graded, sub-round, wet; less gravel. (SW) **Sandy Gravel** : olive gray (5Y 4/1), fine grained, well graded, sub-round, wet. (GW)			BH & BZ PID = 0 ppm, core temp = 12 C.
						105	
40	X	5/10/7	100	**Sand** : olive gray (5Y 4/1), coarse grained, well graded, sub-round, wet; few fines, some gravel at 41.4'. (SW)			BH & BZ PID = 0 ppm, core temp = 12 C. 1.5' Heave, sieve sample from 40'-41.5'.
						100	
45							
						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: **06-MW-04**

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 50.00 START DATE: 7/15/92 FINISH DATE: 7/15/92
GEOLOGIST: GJC APPROVED BY: S.T. Godard R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Waste Accumulation Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0				**Sandy Silt**: grayish brown (5YR 3/2), soft, non-plastic, moist; topsoil, very fine grain sand, abundant plant roots. (ML)	140.60 / 140	Logged from cuttings, 0'-4'.
5	X	2/2/2/3	100	**Sandy Silt**: grayish brown (5YR 3/2), soft, non-plastic, moist; scattered woodchips from 4' to 4.5', sparse iron staining, very fine grain sand. (ML)	135	BH PID = 1 ppm, BZ PID = 0.5 ppm. Sample 4'-6', 06-MW-04-02. Headspace at 6' = 10 ppm. Water level at 6.4' BGL.
10	X	2/3/2	100	**Sand**: olive gray (5YR 4/1), fine grained, poorly graded, sub-round, wet; trace gravel, woodchips. (SP)	130	BH PID = 3.5 ppm, BZ PID 0.5 ppm.
15	X	3/3/2	100	**Sand**: medium dark gray (N4), fine grained, poorly graded, sub-round, wet; trace gravel, hydrocarbon odor. (SP)	125	BH PID = 38 ppm, BZ PID = 0.5 ppm.
20	X	3/2/3	100	**Gravelly Sand**: medium dark gray (N4), fine to medium grained, well graded, sub-round, wet; hydrocarbon odor. (SW)	120	BH PID = 385 ppm, BZ PID = 0.5 ppm.
25	X	2/3/3	100	**Sandy Gravel**: medium dark gray (N4), fine grained, well graded, sub-round, wet; hydrocarbon odor. (GW)	115	BH PID = 280 ppm, BZ PID = 0.5 ppm. Benzene Draeger tube at 25', BZ = 0 ppm, 1' heave.
				Gravelly Sand: dark gray (N3), fine grained, poorly graded, sub-round, wet. (SP)		

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 06-MW-04

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	3/3/3	100	**Sand** : dark gray (N3), medium grained, poorly graded, sub-round, wet; hydrocarbon odor. (SP)		110	BH PID = 380 ppm, BZ PID = 1 ppm, 4' heave.
35	X	4/5/7	NR			105	BH PID = 290 ppm, BZ PID = 0.5 ppm.
40	X	2/5/6	NR	**Sand** : dark gray (N3), medium grained, well graded, sub-round, wet; hydrocarbon odor. (SW)		100	BH PID = 290 ppm, BZ PID = 2.5 ppm, 5' heave.
45						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: **06-SB-01**

Page 1 of 1

PROJECT: Galena Stage 3 RI/FS | LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 12.00 | START DATE: 7/16/92 | FINISH DATE: 7/16/92
GEOLOGIST: KLC | APPROVED BY: S.T. Godard | R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling | DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon | EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): West Unit

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Sandy Gravel**: dusky brown (5Y 2/2), fine grained, well graded, sub-round, dry; fill. (GW)		145.80 145	Logged from cuttings, 0' to 5'.
5	X	5/5/5/4	100	**Sandy Gravel**: as above.		140	OVM battery dead.
				Sandy Silt: dark gray (N3), fine grained, soft, non-plastic, moist; hydrocarbon odor and hydrocarbon stain. (ML)			Sample 6.5'-9', duplicate 06-SB-01-01 & 06-DS-02 MS/MSD. Headspace = 27 ppm.
	X	4/5/3/5	100	**Sandy Silt**: as above; some clay, very fine. (ML)			Headspace = 57 ppm.
10	X	1/1/2/3	100	**Sandy Silt**: dark gray (N3), fine grained, soft, non-plastic, moist; hydrocarbon stain. (ML)		135	
				Sand: grayish brown (5YR 3/2), fine grained, poorly graded, sub-round, wet. (SP)			
				End of Borehole at 12' BGL.			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 06-SB-02

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	7.00	START DATE	7/15/92	FINISH DATE	7/15/92
GEOLOGIST	GJC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish		
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg		
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	West Unit				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						142.10	
				Gravelly Sand : brownish gray (5YR 4/1), fine grained, poorly graded, sub-round, moist; fine grain gravel, minor silt. (SP)			Logged from cuttings, 0'-2'.
	X	4/2/3/2	100	Sand : olive gray (5Y 4/1), fine grained, poorly graded, sub-round, moist; trace fine gravel. (SP)		140	BH PID = 0.5 ppm, BZ PID = 0 ppm.
							Headspace = 0.5 ppm.
5	X	4/3/5/3		Sandy Silt : olive black (5Y 2/1), very fine, soft, non-plastic, moist; trace woodchips, minor iron staining. (ML)			BH & BZ PID = 0 ppm.
				End of Borehole at 7' BGL.			Headspace = 0 ppm.

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

Monitor Well #: 07-MW-01

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	15.00	START DATE	8/11/92
FINISH DATE	8/11/92		
GEOLOGIST	R. Petrossian	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Campion		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Clayey Silt : olive gray (5Y 4/1), soft, medium plasticity, moist; micaceous, organics. (ML)		368.40	Logged from cuttings, 0'-3'. OVM not working.
						365	
5	X	1/1/1	100	Silty Sand : olive gray (5Y 4/1), very fine grained, sub-round to sub-angular, firm, moist; organic layers. (SM)			
						360	
10	X	2/7/8	100	Silty Sand : medium dark gray (N5), fine grained, poorly graded, sub-round to sub-angular, hard (frozen), wet. (SM)			Permafrost at 10.5' BGL.
						355	
15				End of Borehole at 15' BGL.			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

Monitor Well #: 07-MW-02

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 23.00
START DATE: 8/11/92
FINISH DATE: 8/11/92
GEOLOGIST: R. Petrossian
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Campion

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						360.50	Background OVM = 0 ppm.
						360	
	X	1/1/2	100	**Clayey Silt**: olive gray (5Y 3/2), very fine grained, poorly graded, firm, medium plasticity, wet; blotchy with dry sandy intervals, organics. (ML)			
				Sand: fine grained, firm. (SP)			
5						355	
	X	0	100	**Silty Sand**: olive gray (5Y 3/2), very fine grained, poorly graded, sub-angular to sub-round, soft, wet; little rootlets. (SM)			OVM = 1.7 ppm, soil headspace.
10	X	1/1/2	100	**Silty Sand**: olive gray (5Y 4/1), very fine grained, poorly graded, sub-angular to sub-round, soft, wet; slightly cohesive. (SM)		350	
15	X	2/2/3	100	**Silty Sand**: dark gray (N3), very fine grained, poorly graded, sub-angular to sub-round, soft, wet; runny, rootlets, black spots approx. 1mm in diameter. (SM)		345	
20	X	3/9/10	100	**Silty Sand**: dark gray (N3), very fine grained, poorly graded, sub-angular to sub-round, soft, wet; some thin black layers. (SM)		340	Hit permafrost at about 21' BGL. Overdrilling to 23' to keep hole open.
				End of Borehole at 23' BGL.			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Monitor Well #: 07-MW-03

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	16.50	START DATE 8/10/92	FINISH DATE 8/10/92
GEOLOGIST	R. Petrossian	APPROVED BY S.T. Godard	R.G.# 275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Campion		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Clayey Silt: olive black (5Y 2/1), firm, low plasticity, wet; roots, slightly clayey. (ML)		365.70 / 365	Logged from cuttings, 0'-2', temp = 11 C. Background OVM = 0 ppm.
	X	1/1/1	100	Clayey Silt: olive black (5Y 2/1), firm, low-plasticity, wet; black oily intervals. (ML)			OVM 53.6 ppm at 1.5'-3.0'.
5						360	No sample.
							OVM = 7.8 ppm on cuttings.
10						355	No sample.
15	X	2/7/15	100	Sand: olive gray (5Y 4/1), slightly silty, very fine grained, poorly graded, sub-round to sub-angular, soft, wet; flattened pebbles in a sand matrix. (SP)		350	Frozen at 15.5' BGL.
				End of Borehole at 16.5' BGL.			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

Monitor Well #: **07-MW-04**

LOG OF DRILLING OPERATIONS

PROJECT **Galena Stage 3 RI/FS** LOCATION **Galena AFS Area, Alaska**
TOTAL DEPTH **55.00** START DATE **8/9/92** FINISH DATE **8/9/92**
GEOLOGIST **R. Petrossian** APPROVED BY **S.T. Godard** R.G.# **275 - Alaska**
DRILLING COMPANY **Hughes Drilling** DRILLER **R. Erickson, R. Ish**
DRILLING METHOD **Grab/Split Spoon** EQUIPMENT **CME 75 Nodwell TrkRg**
DRILL BIT TYPE AND SIZE **Hollow Stem Auger - 4 1/4" ID**
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) **Campion**

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Silt: light brownish-gray (5YR 4/1); 40% pebbles (loose). (ML)		387.80	Logged from cuttings, 0'-5'.
						385	
5	X	2/4/3	100	Gravelly Sand: pale yellow brown (10YR 6/2), very fine grained, poorly graded, sub-round to sub-angular, soft, moist; gravelly at top grading to well sorted sand, darker colored at 6.5'. (SP)			Temp=17 C.
				Sandy Silt: olive gray		380	
10	X	6/4/4	90	Silty Sand: light brownish gray (5Y 6/1), fine grained, well graded, sub-angular to sub-round, soft, moist; loose, gravelly. (SM)			Temp=14 C, OVM = 4.8 ppm.
				Sandy Silt: olive gray (5Y 3/2), very fine grained, poorly graded, sub-round, soft, moist; black intervals, flaky layers, lots of organics, woody plant remains, rootlets. (ML)		375	Strong burning rubber odor.
15	X	1/1/1	100	Sandy Silt: olive gray (5Y 3/2), very fine grained, poorly graded, sub-round, soft, moist. (ML)			No water in hole after 3 mins. with E-line. Temp=13 C.
				Sand: olive gray (5Y 3/2), very fine to fine grained, poorly graded, sub-round, soft, moist; some organics. (SP)		370	
20	X	2/3/4	100	Silty Sand: olive gray (5Y 3/2), very fine grained, poorly graded, round to sub-round, soft, wet; wet sample, micaceous flakes, small silty interval at top. (SM)			Temp= 8 C.
						365	
25	X	2/2/3	NR	Clayey Silt: olive gray (5Y 3/2). (ML)			Piece of clay in the end of spoon.

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	2/6/8	NR				
						355	
35	X	1/1/1/9	100	Sand : olive gray to gray w/brown (5YR 3/2), very fine grained, poorly graded, sub-round, soft, wet; saturated, dripping, uniform "beach" sand. (SP)			Temp=7 C, larger split spoon.
						350	
40	X	2/1/3		Sand : olive gray to grayish brown (5Y 3/2), fine grained, poorly graded, sub-round to round, soft, wet; saturated with water. (SP)			Temp=3.5 C. Pushed 1.5' w/2'2" split spoon, approx. 4.5' heave into augers.
						345	
45	X	2/2/3		Sand : olive gray to grayish brown (5Y 3/2), fine grained, poorly graded, sub-round to round, soft, wet; saturated with water. (SP)			Temp=3 C.
						340	
50							
						335	Drilled 1' through assumed permafrost layer.
55				End of Borehole at 55' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: **07-SB-01**

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 5.00 — START DATE: 8/12/92 — FINISH DATE: 8/12/92
GEOLOGIST: R. Petrossian — APPROVED BY: S.T. Godard — R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling — DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon — EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Campion

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						365.40	
				Gravelly Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-angular, soft, moist; gravel and sand, organics and silt, rootlets. (SP)		365	Logged from cuttings, 0'-3'.
	X	1/1/2/1	100	Silty Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-angular to sub-round, soft, moist; mottled with medium gray (N5) and some organish-brown staining. (SM)			Sample 07-SB-01, OVM = 7.7 ppm off augers. Oderiferous at top (hydrocarbon).
5				End of Borehole at 5' BGL.			Saturated.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Soil Boring #: 07-SB-02

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LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 5.00 START DATE 8/12/92 FINISH DATE 8/12/92
GEOLOGIST R. Petrossian APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) Campion

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Not Defined: lots of organics, some large pieces of wood. (OL)		365.10	Logged from cuttings, 0'-3'. Grass and plants at top.
	X	1/1/1/1	100	Silty Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-angular to sub-round, moist; saturated to dripping point at bottom, some faint orangish brown mottling. (SM)			From sample 0.3 ppm, headspace = 0.3 ppm.
5				End of Borehole at 5' BGL.			

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Monitor Well #: **09-MW-01**

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 55.00 START DATE: 7/9/92 FINISH DATE: 7/9/92
GEOLOGIST: GJC APPROVED BY: S.T. Godard R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0			75	**Sandy Gravel**: dark brown (10YR 3/3), fine grained, poorly graded, moist, sub-round to round, 1/4" to 3/4" gravel. (GP)		140.40 / 140	Headspace 0'- 2' = 5 ppm.
		2/3/4/3	75	**Gravelly Sand**: dark brown (10YR 3/3), medium to coarse grained, well graded, sub-round, moist. (SW)			Sample (2' - 3') 09-MW-01-02. BH & BZ PID = 0 ppm, Headspace 2' - 4' = 7 ppm.
5			100	**Sandy Silt**: dark grayish brown (2.5Y 4/2), soft, non-plastic, moist, wood fragments from 4'- 4.5'. (ML)		135	BH and BZ PID = 0 ppm. 1.5' Sampler from 4.5' - 40.0' BGL at 5' intervals. Water @ 5.2' BGL.
				Gravelly Sand: dark grayish brown (2.5Y 4/2), medium to coarse grained, well graded, sub-round to round, wet. (SW)			
10		1/3/6	100	**Sand**: grayish brown (2.5Y 5/2), medium to coarse grained, sub-round, wet. (SW)		130	BH and BZ PID = 0 ppm.
15		1/3/5	100	**Sand**: as above.		125	BH and BZ PID = 0 ppm.
20		2/3/4	100	**Sand**: grayish brown (2.5Y 5/2), medium to coarse grained, well graded, trace of fine gravel, wood fragments from 21.3'- 21.5. (SW)		120	BH and BZ PID = 0 ppm. At 20', 3' of heave, pull auger, remove heave.
25		5/3/3	66.6	**Gravel**: fine to coarse grained, well graded, round, wet, 1/4"- 1" gravel. (GW)		115	BH and BZ PID = 0 ppm.

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	4/3/3	100	**Sand** : grayish brown (2.5Y 5/2), coarse to very coarse grained, poorly graded, round, wet, trace 1/8" gravel. (SP)		110	BH and BZ PID = 0 ppm. At 30', 7' of heave, pull up to 25' and remove heave.
				Gravel : fine grained, poorly graded, round, wet, 1/8"- 1/4" gravel. (GP)			
35	X	4/3/2	NR	**No Sample**		105	BH and BZ PID = 0 ppm.
40	X	8/5/4	100	**Sand** : grayish brown (2.5Y 5/2), medium to coarse grained, well graded, sub-round, wet, grades to fine gravel. (SW)		100	BH PID = 2.3 ppm, BZ PID = 0 ppm. Continued drilling to 55'.
				Gravel : poorly graded, round, wet, 1/4"- 1/2" gravel. (GP)			
45						95	
50						90	
55				End of Borehole at 55' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: **09-MW-02**

PROJECT: Galena Stage 3 RI/FS   LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 50.00   START DATE: 7/9/92   FINISH DATE: 7/9/92
GEOLOGIST: GJC   APPROVED BY: S.T. Godard   R.G.# 275 - Alaska
DRILLING COMPANY: Hughes Drilling   DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon   EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand: very dark gray (10YR 3/1), fine to medium grained, well graded, sub-round, moist, surface topsoil. (SW)		141.00 / 140	PID background = 0 ppm.
2.5–4.5	X	3/4/5/5	100	Silty Sand: dark grayish brown (2.5Y 4/2), fine grained, poorly graded, sub-round, moist, fines; abundant 1/4" - 1/2" gravel. (SM)			Sample (2.5' to 4.5') 09-MW-02-02. Headspace 2.5' - 4.5' = 3 ppm, BH & BZ PID = 0 ppm.
5				Sandy Silt: dark grayish brown (2.5Y 4/2), soft, non-plastic, moist, fines; wood chips; from 4' - 4.1' sparse iron staining. (ML)		135	
10	X	push	100	Gravelly Sand: dark gray (10YR 4/1), medium to coarse grained, poorly graded, sub-round, wet, trace 3/8" gravel throughout, minor fine grain sand, predominantly medium. (SP)		130	1.5" Split spoon from 10' to 41.5'.
15	X	2/2/2	100	Gravelly Sand: as above, 1/4" - 3/8" gravel from 15' to 15.3', predominantly medium. (SP)		125	BH & BZ PID = 0 ppm.
20	X	1/2/3	100	Sand: grayish brown (2.5Y 5/2), medium to coarse grained, poorly graded, sub-round to round, wet, predominantly medium, coarsening downward. (SP)		120	BH & BZ PID = 0 ppm, core temp = 10 C.
				Sandy Gravel: fine grained, poor grading, sub-round to round, wet. (GP)			
25	X	1/3/3	100	Sandy Gravel: fine grained, poorly graded, round, wet, 1/8" - 3/8", occasional 1" gravel. (GP)		115	BH & BZ PID = 0 ppm.

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	5/4/3	NR	**No Sample**		110	Sample washed out, at 30' heaved to 27'. BH & BZ PID = 0 ppm.
35	X	4/7/8	100	**Sandy Gravel** : fine grained, well graded, round, wet, 1/8" - 3/8" gravel, minor 3/4" gravel. (GW)		105	BH & BZ PID = 0 ppm.
40	X	12/14/9	100	**Sand** : dark gray (10YR 5/1), medium to coarse grained, poorly graded, sub-round to round, wet, minor medium, pedominantly coarse, trace fine gravel. (SP)		100	BH & BZ PID = 0 ppm.
45						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

Monitor Well #: 09-MW-03

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 50.00
START DATE: 8/15/92
FINISH DATE: 8/15/92
GEOLOGIST: R. Petrossian
APPROVED BY: S.T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling
DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon
EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						141.50	Spudding hole.
						140	
	X	2/2/2	70	**Silty Sand** : dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-round to sub-angular, very soft, slightly moist, pebbles, rotten rootlets, few pieces of wood. (SM)			OVM = 0 ppm.
5							
						135	
10	X	1/1/2	70	**Sand** : dark yellow brown (10YR 4/2), minor silty, fine grained, poorly graded, sub-angular to sub-round, very soft, moist, few rootlets. (SP)			Starting to hit water. Water level at 10.5' BGL.
						130	
15	X	5/5/4	90	**Gravelly Sand** : dark yellow brown (10YR 4/2), medium grained, poorly graded, very soft, very moist, 20 % pebbles. (SP)			
						125	
20	X	10/11/7	100	**Gravelly Sand** : dark yellow brown (10YR 5/2), fine grained, poorly graded, sub-angular to sub-round, very soft, wet, gravelly at bottom. (SP)			2.5' Heave in augers.
						120	
25	X	21/27/16	100	**Sand** : dark yellow brown (10YR 6/2), coarse grained, well graded, sub-round to round, very soft, wet, 40% gravel. (SW)			4.5' Heave in augers.
						115	

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	12/18/9	100	**Sandy Gravel**: dark yellow brown (10YR 6/2), coarse grained, poorly graded, sub-round to round, very soft, wet, less gravelly. (GP)		110	Took sieve sample.
35	X	12/22/17	100	**Sandy Gravel**: dark gray (5GY 4/1), fine grained, poorly graded, sub-round, wet, color change. (GP)		105	
40	X	18/14/7	100	**Gravelly Sand**: dark gray (5GY 4/1), coarse grained, well graded, sub-round to round, very soft, wet, more felsic, < 20% gravel. (SW)		100	
45	X	19/13/7	100	**Sand**: dark gray (5GY 4/1), coarse grained, poorly graded, sub-round, very soft, wet, not as gravelly, few small pebbles. (SP)		95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 09-MW-04

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 56.00 START DATE 7/7/92 FINISH DATE 7/7/92
GEOLOGIST T. A. Council APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						143.20	
	X	2/18/ 17/16	50	**Sandy Gravel**: fine grained, poorly graded, sub-round, moist. (GP)		140	BH & BZ PID = 0 ppm.
				Sandy Silt: dark grayish brown (2.5Y 4/2), fine grained, soft, non-plastic, moist, woodchips from 3' to 3.5'. (ML)			
5	X	1/1/1/ 1	100	**Silt**: olive brown (2.5Y 4/4), soft, non-plastic, moist to wet, woodchips from 5' to 5.3'. (ML)			BH & BZ PID = 0 ppm. Water at 5.02' BGL, on 8 July 1992.
				Silty Sand: medium grained, poorly graded, wet, logged from cuttings. (SM)		135	Shut down for the day, restarted at 0715, 08 July 92.
10	X	1/1/2/ 3	90	**Silty Sand**: dusky yellow brown (10YR 2/2), fine to medium grained, poorly graded, round, soft, wet, woodchips from 10' to 10.4'. (SM)			BH & BZ PID = 0 ppm, sieve sample collected.
				Sand: dusky yellow brown (10YR 2/2), medium grained, poorly graded, round, soft, wet, sand and minor silt layers. (SP)		130	
				Sand: olive black (5Y 2/1), medium grained, well graded, round, soft, wet, lots of wood. (SW)			
15	X	1/2/3/ 4	70	**Gravelly Sand**: olive black (5Y 2/1), medium to coarse grained, well graded, round, wet, gravel fine, well rounded, MaFics 15% to 20%. (SW)		125	SS stuck in hole, pulled augers to retrieve, 0815 augers out of hole, sieve sample collected.
20	X	1/1/1	100	**Sand to Gravelly Sand**: olive black (5Y 2/1), medium to coarse grained, well graded, round, soft, wet, fining up. (SW)		120	18" 1.5" I.D. sampler, top 6" could be heaved sand.
25	X	2/5	87	**Gravelly Sand**: olive black (5Y 2/1), medium to coarse grained, well graded, round, very soft, wet, bottom 0.3' of Split Spoon is gravel unit, may have interbedded gravel and sand. (SW)			1.6' Heave up inside augers, lifted augers 6", rod fell to TD. Drove 12", top 1' of 1.3' SS heaved sands, BH PID = 0.6 ppm, BZ PID = 0.6 ppm

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	2/3	100	**Sand** : olive black (5Y 2/1), medium grained, poorly graded, round, very soft, wet, wood at 30.6'. (SP) **Gravelly Sand** : olive black (5Y 2/1), coarse grained, well graded, round, wet, distinct gravel unit at bottom of split spoon. (SW)		110	Drove SS 12", top 0.8' of recovery may be heaved sands, wood in ^C cuttings, drilling through old trees. BH PID = 0.6 ppm, BZ PID = 0.6 ppm.
35	X	4/8	100	**Gravelly Sand** : olive black (5Y 2/1), medium to coarse grained, well graded, round, soft, wet, 0.3' thick, coarse sand and gravelly layers, fine gravel at bottom of split spoon, pebbles up to 0.75". (SW)		105	Sands still heaving when sampling/removing rods.
40	X	7/19	100	**Gravelly Sand** : olive black (5Y 2/1), medium to coarse grained, well graded, round, very soft, wet, gravel layer at 40.4', lots of wood. (SW)		100	Cuttings are not cold, 10 C, sample may be mostly heaved sands. Through the woody layer.
45	X	9/14	40	**Gravelly Sand** : as above, no wood in split spoon.		95	Stopped drilling to get more augers, there is 7' of heave up ^C inside of augers.
50	X	6/11	100	**Sandy Gravel** : fine grained, well graded, round, wet, "reducing" odor. (SW)		90	6' Heave inside augers, raised augers 1' and rod with sampler. Dropped to 50' BGL.
				Sand : olive black (5Y 2/1), medium grained, poorly graded, round, very soft, wet, woodchips medium to fine samples. (SP)			
55	X	9/12	70				BH PID = 0.6 ppm, BZ PID = 0.6 ppm.
				End of Borehole at 56' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS
LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	50.00
START DATE	8/16/92
FINISH DATE	8/16/92
GEOLOGIST	R. Petrossian
APPROVED BY	S.T. Godard
R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling
DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon
EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						139.00	
	X	2/1/2	100	Sandy Silt: brownish gray (5YR 4/1), fine grained, poorly graded, very soft, non-plastic, moist; sandy intervals, 1mm thick, organic roots, micaceous. (ML)		135	Headspace OVM = 0 ppm.
5							
						130	Water at 8'2" BGL.
10	X	1/1/2	50	Silty Sand: dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-round to sub angular, very soft, wet; some pebbles (15%) in matrix, rather smooth and rounded. (SM)			
						125	
15	X	3/6/11	85	Gavelly Sand: dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-round to sub-angular, very soft, wet; interval of pebbles at bottom 4" thick, alot of quartz pebbles up to 1/2" in diameter. (SP)			Headspace OVM = 0 ppm.
						120	
20	X	1/1/1	80	Gravelly Sand: dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-angular to sub-rounded, very soft, wet; woodchips, probably slough, micaceous. (SP)			
						115	
25	X	2/2/6	100	Gravelly Sand: light olive gray (5Y 6/1), fine grained, poorly graded, sub-round to sub-angular, very soft, non-plastic, wet; very gravelly, not much sand, at bottom for about 3" 50% quartz. (SP)			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						110	
30	X	5/16/13	100	Gravelly Sand : dark yellow brown (10YR 4/2), fine grained, poorly graded, sub-round to sub-angular, very soft, wet; color change, 3" gravel at bottom, coarser than before. (SP)			
						105	
35	X	10/23/10	100	Sand : light olive gray (5Y 6/1), fine grained, poorly graded, sub-round, very soft, wet; coarser grained and color change. (SP)			
						100	
40	X	9/14/8	100	Gravelly Sand : light olive gray (5Y 6/1), fine grained, well graded, sub-round, very soft, wet; coarsening downward, 50% quartz, 30% mafic. (SW)			Approximately 4' heave in augers.
						95	
45							
						90	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 09-MW-06

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 50.00 START DATE 8/17/92 FINISH DATE 8/17/92
GEOLOGIST P. A. Coplen APPROVED BY S.T. Godard R.G.# 275 - Alaska
DRILLING COMPANY Hughes Drilling DRILLER R. Erickson, R. Ish
DRILLING METHOD Grab/Split Spoon EQUIPMENT CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) Million Gallon Hill

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						137.90	BZ PID = 0 ppm.
						135	
5	X	2/2/2/3	100	**Silt**: olive gray (5Y 4/1), soft, medium plasticity, moist; few gravel <30mm, many rootlets and woodchips. (ML)			BH PID = 0 ppm, collected normal and dupe.
	X	2/2/2/2	100	**Sand**: olive gray (5Y 3/2), fine to medium grained, poorly graded, round, moist. (SP) **Gravelly Sand**: olive gray (5Y 3/2), fine to coarse grained, well graded, round to sub-round, wet. (SW)		130	BH PID = 0 ppm. Water at 6.1' BGL.
10	X	2/2/3	60	**Gravelly Sand**: olive gray (5Y 3/2), medium to coarse grained, well graded, round, wet. (SW) **Silt**: soft, medium plasticity; rootlets/organic debris in silt. (ML)			BH & BZ PID = 0 ppm, left augers open to check water level.
						125	
15	X	2/2/5		**Sand**: olive gray (5Y 3/2), fine grained, well graded, round, wet; some gravel <1%, 4" of medium to coarse grained sand at 15.8' to 16'. (SW)			BH PID = 0 ppm, temp = 4 C.
						120	Cuttings = 0.0.
20	X	7/33	100	**Sand**: olive gray (5Y 3/2), medium to coarse grained, well graded, round, wet; sand coarsens with depth, some gravel. (SW)			BH & BZ PID = 0 ppm, 6" heave in augers, stopped hammer after ^C second 6", 5'of heave when hole re-entered with bit.
						115	
25				**Sand**: olive gray (5Y 3/2), medium to coarse grained, well graded, round to sub-round, wet; few gravel <5%. (SW)			6' Heave when re-entered with bit, collected sieve sample.

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							8' Heave, could not get sample.
						105	
35	X	11/19/12	100	**Sand** : olive gray (5Y 3/2), fine to medium grained, well graded, round, wet; few gravel <1%. (SW)			4' Heave when bit re-entered.
						100	
40							
						95	
45	X	16/29/32	100	**Sand** : medium dark gray (N4), medium-coarse to fine-coarse grained; medium to coarse grain sand grades to finer grain sand with gravel. (SW)			11.5' Heave when bit re-entered, collected sieve sample.
						90	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 10-MW-01

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	50.00	START DATE	7/13/92	FINISH DATE	7/13/92
GEOLOGIST	GJC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish		
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg		
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Vehicle Maintenance Building				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Gravel: dark yellow brown (10YR 4/2), fine to coarse grained, well graded, sub-round to round, moist; 1/8" - 3/4" gravel. (GW)		141.70	Logged from cuttings, 0'-3', background PID = 0 ppm.
						140	
	X	2/3/3/3	100	Sandy Silt: olive gray (5Y 4/1), soft, non-plastic, moist; very fine grain sand, minor woodchips from 3.5' to 4.5' BGL. (ML)			BH & BZ PID = 0 ppm, sample 3' - 6' 10-MW-01-01, 10-DS-01.
5	X	2/3/1/2	50	Sandy Silt: as above; concrete fragments at 6'.			
						135	
							Water at 7.7' BGL.
10	X	2/3/2	100	Sand: dark yellowish brown (10YR 4/2), medium to fine grained, poorly graded, sub-round, wet; trace 1/8" gravel, predominantly medium grain. (SP)			BH & BZ PID = 0 ppm, core temp = 12 C.
						130	
15	X	1/3/2	100	Sand: dark yellowish brown (10YR 4/2), fine to coarse grained, well graded, sub-round to round, wet; coarsening downward, 1/8" to 1/4" gravel from 15.7' to 16.2'. (SW)			BH & BZ PID = 0 ppm, core temp = 12 C, sieve sample (15'-16.5').
						125	
20	X	5/9/9	100	Sandy Gravel: dark yellowish brown (10YR 4/2), fine to coarse grained, well graded, round, wet; 1/8" gravel from 20' to 20.3', 1/8" to 3/4" gravel from 20.3' to 21.5'. (GW)			BH & BZ PID = 0 ppm, heave from 20'-19', core temp = 11 C.
						120	
25	X	5/7/7	100	Sandy Gravel: dark yellowish brown (10YR 4/2), fine grained, poorly graded, round, wet; 1/8" gravel, gravelly sand fine to coarse grain from 26' to 26.5', fine to coarse sand from 26' to 26.5'. (GP)			BH & BZ PID = 0 ppm, heave from 25'-24', core temp = 11 C. Sieve sample (25'-26.5).
						115	

NOTES
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	3/5/6	100	**Sandy Gravel**: dark yellowish brown (10YR 4/2), fine to coarse grained, well graded, round, wet; 1/8" to 3/4" gravel coarsening downward, minor 3/4" gravel, sand medium to coarse from 30' to 30.5'. (GW)		110	BH & BZ PID = 0 ppm, heave from 30'-28.5', core temp = 11 C.
35	X	2/3/4	100	**Sandy Gravel**: olive gray (5Y 4/1), fine grained, poorly graded, round, wet; predominantly 1/8" to 1/4" gravel, minor 3/4" gravel. (GP)		105	BH & BZ PID = 0 ppm, core temp = 11 C.
40	X	4/7/5	100	**Sandy Gravel**: olive gray (5Y 4/1), coarse to fine grained, well graded, round to sub-round, wet; 3/4" to 1/8" fencing downward. (GW)			BH & BZ PID = 0 ppm, heave from 40'-38.5'.
				Sand: olive gray (5Y 4/1), medium to coarse grained, well graded, sub-round, wet; trace fine gravel, minor fine grain sand. (SW)		100	Heave from 41.5'-35', pull auger to 39' to drop out heave.
45						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	50.00	START DATE 7/12/92	FINISH DATE 7/12/92
GEOLOGIST	GJC	APPROVED BY S.T. Godard	R.G.# 275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Vehicle Maintenance Building		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand : dark grayish brown (10YR 4/2), fine to medium grained, well graded, sub-round, moist; surface topsoil, 1/4" to 3/4" gravel. (SW)		142.40	Logged from cuttings, 0 to 4'.
						140	
5	X			Sandy Silt : very dark gray (10YR 3/1), fine grained, soft, non-plastic, moist; hydrocarbon odor, trace gray discoloration. (ML)			BH PID = 1.5 ppm, BZ PID = 0 ppm. Sample (4'-5.5') 10-MW-02-02, headspace from 4'-5.5' = 432 ppm.
						135	
10	X	2/4/6	100	Sand : dark gray (10YR 4/1), medium to fine grained, poorly graded, sub-round, wet; slight hydrocarbon odor. (SP)			BH PID = 17.8 ppm, BZ PID = 0 ppm, sieve sample (10'-11.5').
						130	
15	X	2/5/7	100	Gravelly Sand : dark gray (10YR 4/1), medium to coarse grained, well graded, sub-round to round, wet; common 1/8" to 1/4" gravel throughout, slight hydrocarbon odor. (SW)			BH PID = 78 ppm, BZ PID = 0 ppm, core temp = 12 C.
						125	
20	X	12/22/24	100	Gravelly Sand : dark gray (10YR 4/1), fine to coarse grained, well graded, round, wet; fine gravel to 3/4". (SW)			BH PID = 14 ppm, BZ PID = 0 ppm, core temp = 12 C. Heave from 20'-19'.
						120	
25	X	25/36/25	100	Gravelly Sand : dark gray (10YR 4/1), fine to coarse grained, well graded, round, wet; fine gravel to 3/4". (SW)			BH PID = 8 ppm, BZ PID = 0 ppm, core temp = 12 C. Heave from 25'-26', sieve sample (25'-26.5').
						115	

NOTES

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BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X		100	**Gravelly Sand**: dark gray (10YR 4/1), fine to coarse grained, well graded, round, wet; fine gravel to 3/4". (SW)			BZ PID = 0 ppm, core temp = 12 C. Heave from 30'-29'.
						110	
35	X		100	**Gravelly Sand**: dark gray (10YR 4/1), fine to coarse grained, well graded, round, wet; fine gravel. (SW)			BZ PID = 0 ppm, core temp = 12 C. Heave from 35'-34'.
						105	
40	X	11/11/12	100	**Gravelly Sand**: dark gray (10YR 4/1), fine to coarse grained, well graded, round, wet. (SW)			BH PID = 6.2 ppm, BZ PID = 0 ppm. Heave from 40'-38'. No samples from 41.5' to 50'.
						100	
45							
						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 10-MW-03

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	50.00	START DATE	7/11/92	FINISH DATE	7/11/92
GEOLOGIST	GJC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish		
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg		
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Vehicle Maintenance Building				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				**Gravelly Sand**: very dark gray (10YR 3/1), fine to medium grained, well graded, sub-round, moist; surface topsoil. (SW)		142.70	Logged from cuttings, 0'-4'.
				Silty Sand: very dark grayish brown (10YR 3/2), fine grained, poorly graded, sub-round, moist; sparse gravel, 1/4" to 3/8". (SM)		140	
5	X	2/3/5/4	100	**Sandy Silt**: very dark gray (10YR 3/1), soft, non-plastic, moist; scattered woodchips from 5' to 5.7', sparse organics. (ML)			BH & BZ PID = 0 ppm, sample 4' to 6' 10-MW-03-02. Headspace 4'-6' = 0 ppm.
						135	
10	X	1/2/2	100	**Sand**: dark grayish brown (10YR 4/2), medium to coarse grained, poorly graded, sub-round, wet; predominantly medium. (SP)			
						130	
15	X	3/4/5	100	**Sand**: dark grayish brown (10YR 4/2), medium to coarse grained, poorly graded, sub-round to round, wet; predominant medium, interbedded gravel 1/4" to 3/8" from 15.4' to 15.8', minor 1/4" gravel to 16.5'. (SP)			BH & BZ PID = 0 ppm.
						125	
20	X	2/2/3	100	**Sand**: dark gray (10YR 4/1), medium to coarse grained, well graded, sub-round to round, wet; minor 1/8" to 1/4" gravel from 21' to 21.5'. (SW)			Core temp = 9 C.
						120	
25	X	3/5/6	100	**Sand**: dark gray (10YR 4/1), medium to coarse grained, well graded, sub-round to round, wet; coarsening downward. (SW)			
				Gravel: fine to coarse grained, well graded, round, wet; 1/8" to 3/8" gravel. (GW)			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 10-MW-03

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30	X	2/5/6	100	**Sand** : dark gray (10YR 4/1), medium to coarse grained, well graded, sub-round to round, wet; coarsening downward. (SW)			
				Gravel : fine to coarse grained, well graded, round, wet; 1/8" to 3/8" gravel. (GW)		110	
35	X	2/2/5	100	**Sand** : dark gray (10YR 4/1), fine to medium grained, poorly graded, sub-round, wet. (SP)			Core temp = 9 C.
						105	
40	X	3/6/5	100	**Sand** : dark gray (10YR 4/1), fine to coarse grained, well graded, sub-round, wet; 1/8" to 1/4" gravel from 41.2' to 41.5'. (SW)			BH & BZ PID = 0 ppm, core temp = 8 C. No split spoon sample from 41.5' to 50'.
						100	
45							
						95	
50				End of Borehole at 50' BGL.			

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	7.00	START DATE	7/15/92
FINISH DATE	7/15/92		
GEOLOGIST	GJC	APPROVED BY	S.T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Vehicle Maintenance Building		

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Gravelly Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, moist; fine grains sand, silty. (SP)		142.30	Logged from cuttings from 0'-2'.
	X	5/7/15/12	100	Gravelly Sand: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, moist; decrease gravel with depth. (SP)		140	Sample 2'-4', 10-SB-01-01. Headspace = 0 ppm. BH PID = 0.5 ppm, BZ PID = 0 ppm.
5	X	2/3/3/2	100	Sandy Silt: olive black (5Y 2/1), very fine grained, soft, non-plastic, moist; very fine grain sand, sparse iron staining. (ML)			Sample 5'-7', 10-SB-01-02. Headspace = 0 ppm. BH & BZ PID = 0 ppm.
				End of Borehole at 7' BGL.			

****NOTES****
BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 10-SB-02

PROJECT	Galena Stage 3 RI/FS			LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	6.00	START DATE	7/13/92	FINISH DATE	7/13/92
GEOLOGIST	GJC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling			DRILLER	R. Erickson, R. Ish
DRILLING METHOD	Grab/Split Spoon			EQUIPMENT	CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Vehicle Maintenance Building				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						141.50	Logged from cuttings 0'-1'.
	X	1/1/1/1	100	Silty Sand : olive gray (5Y 4/1), fine grained, poorly, sub-round, moist; gravelly 1/4" to 3/4", minor > 1". (SM)		140	Sample 1'-3', 10-SB-02-01. Headspace = 660 ppm.
				Sandy Silt : olive black (5Y 2/1), very fine grained, soft, non-plastic, moist; woodchips at 2.5' to 2.7', sparse iron staining. (ML)			
5	X	1/2/5/8	100	Sandy Silt : olive black (5Y 2/1), very fine grained, soft, non-plastic, moist; discolored hydrocarbon odor. (ML)			BH PID = 101 ppm, BZ PPM = 2 ppm. Sample 4'-6', 10-SB-02-02. Headspace = 158 ppm.
				End of Borehole at 6' BGL.			Approx. water depth at 6' BGL.

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 10-SB-03

PROJECT: Galena Stage 3 RI/FS LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 9.00 START DATE: 7/11/92 FINISH DATE: 7/11/92
GEOLOGIST: GJC APPROVED BY: S.T. Godard R.G.#: 275 - Alaska
DRILLING COMPANY: Hughes Drilling DRILLER: R. Erickson, R. Ish
DRILLING METHOD: Grab/Split Spoon EQUIPMENT: CME 75 Nodwell TrkRg
DRILL BIT TYPE AND SIZE: Hollow Stem Auger - 4 1/4" ID
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Vehicle Maintenance Building

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						141.60	
	X	1/1/1/1	75	**Gravelly Sand**: dark grayish brown (10YR 4/2), fine to medium grained, well graded, sub-round, moist; surface topsoil, 1/4" - 3/4" gravel. (SW)		140	Sample 1'-2.5', 10-SB-03-01.
				Silty Sand: dark grayish brown (10YR 4/2), fine grained, poorly graded, sub-round, moist. (SM)			BH & BZ PID = 0 ppm.
5	X	2/2/2/2	75	**Sandy Silt**: very dark gray (10YR 3/1), fine grained, soft, non-plastic, moist; trace woodchips, abundant organics, sparse iron staining. (ML)			Hydrocarbon odor from 4'-5.5'. Sample 4'-5.5', 10-SB-03-02. BH PID = 1.7 ppm, BZ PID = 0 ppm. Headspace = 4.7 ppm.
	X	2/1/3/2	90	**Sandy Silt**: very dark gray (10YR 3/1), fine grained, soft, non-plastic, moist; hydrocarbon odor. (ML)		135	Approx. water level 6.5' BGL. Sample 7'-8.5', 10-SB-03-03.
				Silty Sand: dark yellowish brown (10YR 4/4), fine grained, poorly graded, sub-round, wet; minor thin gray discolored bands, trace iron staining, interbedded fine grain sand from 7.8' to 8.2'. (SM)			Headspace = 85 ppm.
				End of Borehole at 9' BGL.			

NOTES

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM
BGL = Below Ground Level, NR = No Recovery
ppm = parts per million

RADIAN CORPORATION

Soil Boring #: 11-SB-01

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	8.00	START DATE	7/16/92	FINISH DATE	7/16/92
GEOLOGIST	KLC	APPROVED BY	S.T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	Hughes Drilling	DRILLER	R. Erickson, R. Ish		
DRILLING METHOD	Grab/Split Spoon	EQUIPMENT	CME 75 Nodwell TrkRg		
DRILL BIT TYPE AND SIZE	Hollow Stem Auger - 4 1/4" ID				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Underground Storage Tank				

Depth Below Surface (ft)	Sample Interval	Blow Count	Sample Recovery %	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0				Sandy Silt: dark yellowish brown (10YR 4/2), very fine grained, soft, non-plastic, moist; roots. (ML)		139.90	Logged from cuttings 0' to 2'.
	X	2/1/2/4	100	Sandy Silt: grayish brown (5YR 3/2), very fine grained, soft, non-plastic, moist; minor clay, roots, woodchips, organics. (ML)			BH & BZ PID = 0 ppm.
							Headspace = 0 ppm.
5	X	1/1/2/3	100	Sandy Silt: dark yellowish brown (10YR 4/2), very fine grained, soft, non-plastic, moist. (ML)		135	BH PID = 3 ppm, BZ PID = 0 ppm.
							Headspace = 0 ppm.
				End of Borehole at 8' BGL.			

****NOTES****

BH PID = Borehole OVM, BZ PID = Breathing Zone OVM

BGL = Below Ground Level, NR = No Recovery

ppm = parts per million

1993 Drilling Logs

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 01-MW-07

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 50.00 — START DATE: 8/6/93 08:30 — FINISH DATE: 8/6/93 11:00
GEOLOGIST: T. A. Council — APPROVED BY: S. T. Godard — R.G.# 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR — DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger — EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Fire Training Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	Pushed	1.75:2	Gravelly Sand: very dark gray (5Y, 3/1), fine to medium grained, well graded, round, moist; pebbles up to 4 cm. (SW)		143.19	
				Sandy Silt: very dark gray (5Y 3/1), hard, non-plastic, moist. (ML)		140	
5	X		1.75:2	Sandy Silt: olive gray (5Y 4/2), soft, non-plastic, moist; wood fragments from 5'-6'. (ML)			0.4 ppm downhole
						135	Lots of wood chips in cuttings.
10	X	1/1/1/1	2:2	Silt: olive gray (5Y 4/2), soft, non-plastic, moist; minor clay. (ML)			
				Clayey Silt: very dark green (N3), soft, non-plastic, wet. (ML)		130	
15	X	2/3/3/3	2:2	Sand: olive gray (5Y 4/2), fine to medium grained, poorly graded, soft, moist; clay plug in bottom of split spoon, wood fragments in last 2" of split spoon. (SP)			Noted change in cuttings at approx. 14.2' BGS.
						125	Cuttings wet at approx. 17' BGS.
20		N/A	N/A	Sand: olive gray (5Y 4/2), fine to medium grained, poorly graded, wet. (SP)			Logging from cuttings, below water table.
						120	
25							No change in lithology noted from cuttings.

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

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LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						110	
35							
						105	
40							
						100	
45							
						95	
50							Total Depth = 50' BGS.

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 45.00 START DATE 7/8/93 08:30 FINISH DATE 7/8/93 11:00
GEOLOGIST T. A. Council APPROVED BY S. T. Godard R.G.# 275 - Alaska
DRILLING COMPANY 11 CEOS/CEOR DRILLER E. Miles
DRILLING METHOD Hollow Stem Auger EQUIPMENT CME - 850
DRILL BIT TYPE AND SIZE 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) Fire Training Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	1/1/1/2	2:2	Gravelly Silt: olive gray (5Y 4/2), well graded, hard, non-plastic, dry; sandy, gravel zones at 1', rootlets common. (ML)		153.49	
						150	
5	X	2/4/5/8	2:2	Sandy Silt: gray (5Y 5/1), poorly graded, hard, non-plastic, dry. (ML)			
				Silty Sand: gray (5Y 5/1), fine grained, well graded, soft, non-plastic, dry to wet. (SW)		145	
10	X	1/1/1/2	2:2	Sandy Silt: olive gray (5Y 4/2), poorly graded, soft, non-plastic, moist. (ML)			
				Silt: very dark gray (5Y 3/1), soft, non-plastic, moist; minor clay. (ML)		140	
15	X	1/1/1/1	2:2	Clayey Silt: very dark gray (5Y 3/1), soft, non-plastic, wet; increasing clay with depth, some sand at 15'-16'. (ML)		135	
20	X	1/1/2/3	2:2	Clayey Silt: very dark gray (5Y 3/1), medium plasticity, wet; wood at 21'. (MH)			
				Silt: non-plastic, moist; some areas are still moderately plastic, clay content decreasing with depth. (ML)		130	Water level at 23' BGS.
25	X	1/3/5/6	2:2	Sand: dark olive gray (5Y 3/2), fine to medium grained, poorly graded, soft, wet to saturated. (SP)			No samples collected below water table.

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 01-MW-08

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						125	
30		N/A	N/A				
				Clayey Silt: dark olive gray (5Y 3/2), low plasticity, wet. (ML)			
						120	
35							
				Clayey Sand: dark olive gray (5Y 3/2), fine to medium grained, poorly graded, wet. (SP)			
						115	
40							
						110	
45							Total Depth at 45' BGS.

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 01-SB-03

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 10.00
START DATE: 8/9/93 15:15
FINISH DATE: 8/9/93 16:25
GEOLOGIST: B. J. Coel
APPROVED BY: S. T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR
DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): Fire Training Area

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						146.33	
0	X	1/1/2/3	2:2	Silt: olive gray (5Y 4/2), poorly graded, soft, non-plastic, dry; abundant wood chips and roots. (ML)		146	BH = 6 ppm, BZ = <1 ppm, HS = 0 ppm. Collected sample 01-SB-03-01 and 01-SB-03-DS-01.
2	X	1/2/2/3	2:2	Silt: dark olive gray (5Y 3/2), poorly graded, soft, non-plastic, dry; rootlets with oxidation. (ML)		144	BH = 0 ppm, HS = 0 ppm. Collected sample 01-SB-03-02.
4	X	1/1/2/3	2:2	Silt: olive (5Y 4/3), poorly graded, soft, non-plastic, moist; wood chips and twigs, oxidation zones along rootlets. (ML)		142	BH = 1 ppm, HS = 0 ppm. Collected sample 01-SB-03-03.
6						140	
8	X	1/1/2/2	2:2	Clayey Silt: black (5Y 2.5/2), poorly graded, soft, low plasticity, moist; twigs, more finely grained than above, mat of roots near top, silt layer at top of core without clays. (ML)		138	BH < 1 ppm. Collected sample 01-SB-03-04.
10							End of Borehole at 10' BGS.

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 01-SB-04

Page 1 of 1

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	10.00	START DATE 8/10/93 09:40	FINISH DATE 8/10/93 10:45
GEOLOGIST	B. J. Coel	APPROVED BY S. T. Godard	R.G.# 275 - Alaska
DRILLING COMPANY	11 CEOS/CEOR	DRILLER	E. Miles
DRILLING METHOD	Hollow Stem Auger	EQUIPMENT	CME - 850
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Fire Training Area		

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0		1/2/5/10	2:2	Gravelly Silt: olive (5Y 4/3), fine grained, poorly graded, sub-round, soft, non-plastic, dry; abundant coarse gravel, sub-round, root mat at top, trace wood chips, platey, oxidation zones. (ML)		151.00 150	BZ = 0 ppm, BH = 6 ppm, HS = 0 ppm. Collected sample 01-SB-04-01.
2		2/3/5/7	2:2	Clayey Silt: very dark gray (5Y 3/1), fine grained, poorly graded, soft, low plasticity, dry; wood chips, platey, trace oxidation zones along some plates. (ML)		148	BH = 20 ppm, BZ = 0 ppm, HS = 20 ppm. Collected sample 01-SB-04-02.
4		3/3/5/5	2:2	Clayey Silt: dark olive gray (5Y 3/2), fine grained, poorly graded, low plasticity, moist; less clay, less plastic than above, trace pebbles, trace wood, no oxidation, platey, barely moist. (ML)		146	BH = 20 ppm, BZ = 0 ppm, HS = 20 ppm. Collected sample 01-SB-04-03.
6						144	
8		1/1/1/2	2:2	Clayey Silt: dark grayish brown (5Y 4/2), fine grained, poorly graded, soft, low plasticity, moist; less clay, less plastic than above, large pieces of wood and twigs, root mat, barely moist. (ML)		142	BH = 20 ppm, BZ = 0 ppm, HS = 35 ppm. Collected sample 01-SB-04-04.
10							End of Borehole at 10' BGS.

NOTES

FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface

ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: **05-MW-13**

PROJECT	Galena Stage 3 RI/FS		LOCATION	Galena AFS Area, Alaska	
TOTAL DEPTH	42.50	START DATE	8/25/93 08:15	FINISH DATE	8/25/93 10:15
GEOLOGIST	R. V. Petrossian	APPROVED BY	S. T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	11 CEOS/CEOR		DRILLER	E. Miles	
DRILLING METHOD	Hollow Stem Auger		EQUIPMENT	CME - 850	
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A with 8 1/4" OD Cutter Head				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	West of POL, near installation entrance.				

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	1/5/6/10	2:2	**Gravelly Sand**: grayish brown (5YR 3/2), fine to coarse grained, well graded, sub-round, very soft, non-plastic, moist; very loose, slightly silty. (SW)		147.01	BG = 0 ppm, BZ = 0 ppm.
	X	3/3/4/3	2:2	**Sandy Silt**: olive gray (5Y 4/1), fine grained, moderate to poorly graded, sub-round, soft, non-plastic, moist; slightly gravelly at top 6". (ML)		145	
	X	2/1/2/3	2:2	**Sandy Silt**: olive gray (5Y 3/2), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; slightly mottled, reddish staining, wood chips. (ML)			BG = 0 ppm, BZ = 0 ppm, BH = 0 ppm.
5	X	2/1/1/2	2:2	**Sandy Silt**: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; micaceous, small roots, light brown staining mostly along roots, discontinuous laminations. (ML)		140	
	X	1/2/1/2	2:2	**Silty Sand**: dark yellow brown (10YR 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; sandy interlayers, micaceous layers, decreasing silt downwards, light brown staining. (SP)			
10	X	2/3/4/4	2:2	**Silty Sand**: pale yellowish (10YR 6/2), fine to medium grained, poorly graded, sub-angular, very soft, non-plastic, moist; moderately to loose sand 0.7' from top. (SM)		135	BZ = 0 ppm, BH = 0 ppm.
	X	1/2/3/2	2:2	**Silty Sand**: as above. (SM)			
15	X	1/2/3/3	1.6:2	**Silty Sand**: dark yellowish brown (10YR 4/2), fine to medium grained, poorly to moderately graded, sub-angular, very soft, non-plastic, wet; moderately to loose sand, interlayered coarser intervals, reddish-brown staining, gravel at bottom, micaceous. (SM)		130	Water Level at 16.10' BGS. No samples collected below water table.
20						125	
25						120	

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN
CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: **05-MW-13**

PROJECT **Galena Stage 3 RI/FS** LOCATION **Galena AFS Area, Alaska**

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						115	
35							
						110	
40							
						105	End of Borehole at 42.5' BGS.

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: 05-MW-14

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska
TOTAL DEPTH 37.50 START DATE 8/27/93 09:20 FINISH DATE 8/27/93 10:35
GEOLOGIST R. V. Petrossian APPROVED BY S. T. Godard R.G.# 275 - Alaska
DRILLING COMPANY 11 CEOS/CEOR DRILLER E. Miles
DRILLING METHOD Hollow Stem Auger EQUIPMENT CME - 850
DRILL BIT TYPE AND SIZE 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) On Tarmac, south of POL.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	2/2/4/4	2:2	Silty Gravel: dark yellowish brown (10YR 4/2), fine to coarse grained, well graded, sub-round, very soft, non-plastic, moist. (GW)		142.05	BG = 0 ppm.
	X	1/2/4/4	2:2	Sandy Silt: olive gray (5Y 4/1), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; silt is micaceous. (ML)		140	
	X	1/3/4/4	2:2	Sandy Silt: as above. (ML)			BG = 0 ppm, BZ = 0 ppm, BH = 0 ppm.
5	X	1/2/3/3	2:2	Silty Sand: dark yellow brown (10YR 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; silt interlayers, top slightly laminated with rootlets. (SM)		135	BG = 0 ppm, BZ = 0 ppm, BH = 0 ppm.
	X	3/3/3/4	2:2	Silty Sand: as above. (SM)			
10	X	3/3/3/3	1.6:2	Gravelly Sand: dark yellowish brown (10YR 4/2), fine to coarse grained, well graded, sub-round, very soft, non-plastic, wet; very gravelly interval around 1' from top. (SW)		130	Water Level at 12.9' BGS. No samples collected below water table.
15						125	
20						120	
25						115	

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						110	
35							
37.5							End of Borehole at 37.5' BGS.

RADIAN CORPORATION

Monitor Well #: **05-MW-15**

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 41.00
START DATE: 8/28/93 10:11
FINISH DATE: 8/28/93 15:40
GEOLOGIST: R. V. Petrossian
APPROVED BY: S. T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR
DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): On Tarmac, southwest of POL.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0					143.34	Hole drilled out to 2', start sampling at 2'.
2–4	X	3/4/4/3	2:2	**Gravelly Sand**: dark yellowish brown (10YR 4/2), fine grained to medium gravel, well graded, sub-round, very soft, non-plastic, dry to moist; loose gravel, increasing sand and consistency downward. (SW)	140	BG = 0 ppm, BZ = 0 ppm.
4–6	X	2/1/1/2	2:2	**Silty Sand**: dark yellowish brown (10YR 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; sandy interlayers. (SM)		
6–8	X	1/1/1/2	2:2	**Silty Sand**: light brownish gray (5YR 6/1), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, very moist; mostly fine micaceous sands with brown staining, small medium grained sandy interlayers. (SM)	135	Hit very hard substrate, consulting soil gas data.
8–10	X	13/16/20/16	2:2	**Silty Sand**: brownish gray (5YR 4/1), fine to medium grained, poorly graded, sub-round, hard, non-plastic, wet; permafrost layer 0.2' below top, saturated throughout, mostly medium grained sand. (SM)		BG = 0 ppm, BZ = 0 ppm.
10–12	X	16/25/30/33	1.7:2	**Silty Sand**: as above; permafrost entire length. (SM)	130	
15						BZ = 0 ppm, BH = 0 ppm.
19–21	X	50	0.7:2	**Gravelly Sand**: fine grained to coarse gravel, well graded, sub-angular, hard, non-plastic, wet. (SW)	125	Frozen with some free water.
20–22						No samples collected below water table.
25					120	

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						110	
35							
						105	
40							
							End of Borehole at 41' BGS.

RADIAN CORPORATION

Soil Boring #: 05-SB-04

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LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 10.00
START DATE: 8/11/93 09:50
FINISH DATE: 8/11/93 10:50
GEOLOGIST: B. J. Coel
APPROVED BY: S. T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR
DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): West of POL, near dormitory.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0						148.01	
0	X	4/6/7/9	1.5:2	Gravelly Sand: medium olive brown (5Y 4/4), fine grained, well graded, sub-angular, very soft, non-plastic, dry. (SW)			BG = 1 ppm, BH = 5 ppm, BZ = 1 ppm, HS = 9 ppm. Collected sample 05-SB-04-01.
2						146	
	X	2/4/4/7	2:2	Gravelly Sand: olive (5Y 4/3), fine grained, well graded, sub-round, very soft, non-plastic, moist; moderate hydrocarbon odor. (SW)			BH = 1 ppm, HS = 152 ppm. Collected sample 05-SB-04-02.
4						144	
	X	2/3/5/5	2:2	Silty Sand: dark olive gray (5Y 3/2), fine grained, poorly graded, soft, non-plastic, moist; gravelly at top 6", trace gravel bottom 1.5', 1" clay layer at 1' depth, hydrocarbon odor, trace wood chips. (SM)			BH = 9 ppm, HS = 1080 ppm. Collected sample 05-SB-04-03.
6						142	
	X	1/1/2/4	2:2	Clayey Silt: dark olive gray (5Y 3/2), fine grained, poorly graded, soft, low plasticity, moist; hydrocarbon odor, trace wood chips and twigs. (ML)			BH = 23 ppm, BZ = 1 ppm, HS = 467 ppm. Collected sample 05-SB-04-04.
8						140	
10							End of Borehole at 10' BGS.

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 05-SB-05

Page 1 of 1

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	16.00	START DATE	8/11/93 13:30
FINISH DATE	8/11/93 14:45		
GEOLOGIST	B. J. Coel	APPROVED BY	S. T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	11 CEOS/CEOR	DRILLER	E. Miles
DRILLING METHOD	Hollow Stem Auger	EQUIPMENT	CME - 850
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	West POL		

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	1/2/2/4	2:2	Gravelly Sand: dark olive gray (5Y 3/2), fine grained, well graded, sub-round, very soft, non-plastic, moist; sand with fine to coarse gravel, dry at very top. (SW)		146.16 / 144	BG = 1 ppm, BH = 1 ppm, BZ = 1 ppm. Collected sample 05-SB-05-01.
3							
	X	1/1/3/2	2:2	Clayey Sand: dark olive gray (5Y 3/2), fine grained, well graded, sub-round, soft, low plasticity, moist; sand predominant at top, more clay toward the bottom, abundant gravel in top half, abundant wood, root mat at bottom, organic, faint hydrocarbon odor. (SC)		141	BZ = 1 ppm, BH = 5 ppm, HS = 211 ppm. Collected sample 05-SB-05-02, all but 8240's.
6	X	1/3/3/2	1.5:2	Clayey Silt: dark olive gray (5Y 3/2), very fine grained, poorly graded, soft, low plasticity, moist; at about 6' very organic clayey silt. (MH)		138	BZ = 1 ppm, BH = 20 ppm. Collected 8240's for sample 05-SB-05-02.
9							
	X	1/1/3/6	2:2	Clayey Silt: dark olive gray (5Y 3/2), very fine grained, poorly graded, soft, low plasticity, moist; 3" clay layer at top, 2" sand layer at bottom. (ML)		135	BH = 5 ppm, BZ = 1 ppm, HS = 31 ppm. Collected sample 05-SB-05-03.
12							
15	X	1/1/2/3		Clayey Silt: very dark gray (5Y 3/1), very fine grained, poorly graded, soft, low plasticity, moist to wet; platey, fine interbedded clays and silts, may have hit water or capillary zone above water table, faint hydrocarbon odor. (ML)		132	BH = 5 ppm, BZ = 1 ppm. Collected sample 05-SB-05-04.
							End of Borehole at 16' BGS.

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN
CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: **05-SB-06**

PROJECT **Galena Stage 3 RI/FS** LOCATION **Galena AFS Area, Alaska**
TOTAL DEPTH **14.00** START DATE **8/12/93 08:20** FINISH DATE **8/12/93 09:20**
GEOLOGIST **B. J. Coel** APPROVED BY **S. T. Godard** R.G.# **275 - Alaska**
DRILLING COMPANY **11 CEOS/CEOR** DRILLER **E. Miles**
DRILLING METHOD **Hollow Stem Auger** EQUIPMENT **CME - 850**
DRILL BIT TYPE AND SIZE **4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head**
BORING LOCATION (ST. ADDRESS OR DESCRIPTION) **West POL near boathouse.**

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
						147.24	
0		1/2/3/6	1.5:2	Silt: olive (5Y 4/4), very fine grained, poorly graded, soft, non-plastic, dry; root mat at top, abundant rootlets throughout. (ML)			BG = 1 ppm, BZ = 1 ppm, BH = 14 ppm, HS = 103 ppm. Collected sample 05-SB-06-01.
3						144	
		1/1/1/3	1.5:2	Silt: very dark gray (5Y 3/1), fine grained, poorly graded, soft, non-plastic, moist; trace wood chips and rootlets, moderate hydrocarbon odor, more oxidized at top 3". (ML)			BZ = 1 ppm, BH = 29 ppm, HS = 107 ppm. Collected sample 05-SB-06-02.
6						141	
		1/1/1/3	1.5:2	Clayey Silt: dark olive gray (5Y 3/2), very fine grained, poorly graded, soft, medium plasticity, moist; large (3") piece of burnt wood, very organic, faint hydrocarbon odor, abundant rootlets. (ML)			BZ = 1 ppm, BH = 34 ppm, HS = 173 ppm. Collected sample 05-SB-06-03.
9						138	
12		1/1/2/3	2:2	Clayey Silt: dark olive gray (5Y 3/2), very fine grained, poorly graded, soft, medium plasticity, moist; coarser silt (less clayey) layer at top and bottom, moderate hydrocarbon odor. (ML)		135	BZ = 1 ppm, BH = 17 ppm, HS = 17 ppm. Collected sample 05-SB-06-04.
							End of Borehole at 14' BGS.

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

Monitor Well #: **06-MW-07**

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	41.80	START DATE	8/26/93 10:10
FINISH DATE	8/26/93 12:10		
GEOLOGIST	R. V. Petrossian	APPROVED BY	S. T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	11 CEOS/CEOR	DRILLER	E. Miles
DRILLING METHOD	Hollow Stem Auger	EQUIPMENT	CME - 850
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	BLM housing area, north of installation boundary.		

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0	X	1/7/5/6	2:2	Gravelly Sand: pale yellowish brown (10YR 6/2), fine to coarse grained, well graded, sub-round, very soft, non-plastic, moist; 40% gravel, up to 1" in diameter. (SW)	151.90	BG = 0 ppm, BZ = 0 ppm.
	X	4/3/4/7	2:2	Silty Sand: dark yellowish brown (10YR 6/2), fine grained to fine gravel, moderately graded, sub-round, very soft, non-plastic, moist; mottled, wood chips, intervals of silt >1 cm thick. (SM)	150	
5	X	3/5/5/5	2:2	Silty Sand: brownish gray (5YR 4/1), fine grained to coarse gravel, well graded, sub-round, very soft, non-plastic, moist; wood interval last 6", roots, and some yellow-red staining. (SM)		BZ = 0 ppm, BH = 0 ppm.
	X	3/4/4/5	2:2	Sandy Silt: olive gray (5Y 4/1), fine grained, poorly graded, well rounded, very soft, non-plastic, moist; wood chips, lots of organics, strong organic odor, layers of rootlets and wood chips. (ML)	145	
	X	1/1/1/1	2:2	Sandy Silt: olive gray (5Y 4/2), fine grained, poorly graded, well rounded, very soft, non-plastic, moist; micaceous (small grains, well disseminated), fewer organics, some rootlets. (ML)		
10	X	1/1/1/2	2:2	Sandy Silt: olive gray (5Y 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; contact at 1.4' below top between silt/medium sand, grades back to silt. (ML)	140	
	X	1/1/1/2	2:2	Sandy Silt: olive gray (5Y 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, wet; silt is slightly laminated, sand interlayers are distinctive, organics and rootlets, saturated in middle silt. (ML)		
15	X	1/3/2/3	2:2	Sandy Silt: olive gray (5Y 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, wet; alternating layers of sand and micaceous silt. (ML)	135	
	X	1/1/3/6	2:2			
	X	1/4/4/6	2:2			
20				Silty Sand: dark yellowish brown (10YR 4/2), medium grained, poorly graded, sub-angular, very soft, non-plastic, very moist; gravel interlayers. (SM)		No samples collected below water table.
				Silty Sand: as above; sand is saturated. (SM)	130	
25					125	

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30						120	
35						115	
40							
							End of Borehole at 41.8' BGS.

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: **06-SB-03**

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska		
TOTAL DEPTH	16.00	START DATE	8/14/93 09:45	FINISH DATE	8/14/93 11:20
GEOLOGIST	B. J. Coel	APPROVED BY	S. T. Godard	R.G.#	275 - Alaska
DRILLING COMPANY	11 CEOS/CEOR	DRILLER	E. Miles		
DRILLING METHOD	Hollow Stem Auger	EQUIPMENT	CME - 850		
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head				
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Waste Accumulation Area, west of Building 1700.				

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	1/1/2/2	1.5:2	Sandy Silt: olive (5Y 4/3), fine grained, poorly graded, sub-round, soft, non-plastic, moist; clayey layer 1" thick at 1.5', abundant roots, fairly homogeneous, with well distributed round gravel. (ML)		148.32 / 147	BG = 1 ppm, BH = 48 ppm, BZ = 1 ppm w/spikes of 64 ppm, HS = 583 ppm. Collected 06-SB-03-01.
3	X		1:2	Sandy Silt: dark olive gray (5Y 3/2), fine grained, poorly graded, sub-round, soft, non-plastic, moist; sandy silt w/rounded gravel. (ML)		144	BZ = 48 ppm, donned respirators; BH = 48 ppm, HS = 489 ppm. Collected 06-SB-03-02.
6				Silty Clay: dark olive gray (5Y 3/2), very fine grained, poorly graded, firm, low plasticity, moist; hard clay layer. (ML)		141	
9	X		1.5:2	Silt: very dark gray (5Y 3/1), very fine grained, poorly graded, soft, non-plastic, moist; very homogeneous silt w/a few very fine sand layers, trace wood chips. (ML)			BZ = 32 ppm, BH = 48 ppm. Collected 06-SB-03-03, 8240's in duplicate.
	X	1/1/2/3	2:2	Clayey Silt: black (5Y 2.5/1), very fine grained, poorly graded, soft, low plasticity, moist; abundant wood chips. (ML)		138	BZ = 67 ppm, BH = 127 ppm, HS = 219 ppm. Collected 06-SB-03-03, all analytes except 8240 in duplicate.
12						135	
15	X	1/2/3/5	2:2	Clayey Silt: as above; abrupt change to sand. (ML)			BZ = 17 ppm, BH = 230 ppm, HS = 25 ppm. Collected 06-SB-03-04.
				Sand: olive gray (5Y 4/2), fine grained, poorly graded, sub-angular, very soft, non-plastic, moist; change to sand at 6", small silty clay layer (about 2") at 1.5'. (SP)			End of Borehole at 16' BGS.

****NOTES****

FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface

ppm = parts per million

RADIAN CORPORATION

Monitor Well #: **09-MW-15**

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 40.00 — START DATE: 8/24/93 09:25 — FINISH DATE: 8/24/93 10:50
GEOLOGIST: R. V. Petrossian — APPROVED BY: S. T. Godard — R.G.# 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR — DRILLER: E. Miles, T. Laney
DRILLING METHOD: Hollow Stem Auger — EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): West Unit - North of west end of runway.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0		1/1/1/1	1.9:2	Sandy Silt: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; grass, roots at top 3", gravel at top. (ML)		142.62	
		1/1/2/3	1.8:2	Silty Sand: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; some roots, intervals of medium grained sand <1cm thick, wood chips. (SM)		140	BZ = 0 ppm.
5		1/2/1/1	2:2	Silty Sand: as above, moist to wet at bottom; 6" interval of medium sand from 1'-1.5', very fine sand from 1.5'-2', few rootlets, wood chips. (SM)			BH = 0 ppm.
		1/1/2/3	2:2	Sandy Silt: dark yellowish brown (10YR 4/2), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; 0.7' interval of silt, abrupt change to medium grained sand at 6.7' BGL. (ML)		135	Cuttings = 0 ppm.
		2/3/3/4	2:2	Sand: dark yellowish brown (10YR 4/2), sub-round, very soft, non-plastic, moist; 1' coarse sand to fine gravel. (SP)1			
10		3/4/5/5	2:2	Gravelly Sand: brownish gray (5YR 4/1), medium grained, poorly graded, sub-round, very soft, non-plastic, saturated; small component of silt. (SP)			BZ = 0 ppm, BH = 0 ppm.
						130	Water Level at 11.92' BGS. No samples collected below water table.
15						125	
20						120	
25							

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						110	
35							
						105	
40							End of Borehole at 40' BGS.

Soil Boring #: 09-SB-01

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

PROJECT: Galena Stage 3 RI/FS
LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 9.50
START DATE: 8/14/93 15:15
FINISH DATE: 8/14/93 16:30
GEOLOGIST: B. J. Coel
APPROVED BY: S. T. Godard
R.G.#: 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR
DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): West Unit, west of CAC Hangar.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL) 142.14	Additional Data and Comments
0		1/5/5/8	1.5:2	Gravelly Sand: olive (5Y 4/2), fine grained, well grading, sub-angular, soft, non-plastic, wet. (SW)			BG = 1 ppm, BZ = 1 ppm, BH = 52 ppm, HS = 76 ppm. Collected 09-SB-01-01.
2		2/3/3/4	1.5:2	Clayey Silt: very dark gray (5Y 3/1), very fine grained, poorly graded, soft, non-plastic, moist; Top 3" as above, some clay layers, but not very plastic. (ML)		140	BZ = 1 ppm, BH = 9.6 ppm, HS = 13 ppm. Collected 09-SB-01-02.
4		1/1/2/2	2:2	Clayey Silt: very dark gray (5Y 3/1) to dark olive gray (5Y 3/2); abundant wood chips and oxidation zones, color change from reduced to more oxidized at 0.5'. (ML)		138	BZ = 1 ppm, BH = 9 ppm, HS = 1 ppm. Collected 09-SB-01-03.
6		1/1/2/2	2:2	Sand: olive gray (5Y 4/2), fine grained, poorly graded, sub-angular, soft, non-plastic, moist; fine sand interbedded w/clayey silt layers, trace oxidation zones, trace fine gravel. (SP)		136	BZ =1 ppm, BH = 1 ppm, HS = 1 ppm. Collected 09-SB-01-04.
8						134	
							End of Borehole at 10' BGS.

NOTES
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Monitor Well #: **10-MW-04**

PROJECT	Galena Stage 3 RI/FS
LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	38.50
START DATE	8/29/93 09:20
FINISH DATE	8/29/93 10:30
GEOLOGIST	R. V. Petrossian
APPROVED BY	S. T. Godard
R.G.#	275 - Alaska
DRILLING COMPANY	11 CEOS/CEOR
DRILLER	E. Miles
DRILLING METHOD	Hollow Stem Auger
EQUIPMENT	CME - 850
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	Near southeast corner of CAC hangar.

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0					143.05	
1–3	X	6/8/7/8	2:2	**Gravelly Sand**: brownish gray (5YR 4/1), fine grained to fine gravel, well graded, sub-round, very soft, non-plastic, moist; 40% gravel, very coarse sand, very loose. (SW)		Started sampling at 1', drilled through tarmac. BG = 0 ppm, BZ = 0 ppm.
3–5	X	1/4/3/4	2:2	**Gravelly Sand**: as above. (SW)	140	BH = 0 ppm, BZ = 0 ppm.
				Sandy Silt: dusky yellow brown (10YR 2/2), poorly graded, sub-round, soft, non-plastic, moist; occasional pebbles. (ML)		
5–7	X	1/2/2/3	2:2	**Organic Silt**: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, very soft, low plasticity, moist; gravel at top, lots of organics, strong sulphur odor, black staining, micaceous. (OL)		BH = 0 ppm, BZ = 0 ppm. Sewer odor.
7–9	X	1/2/4/8	2:2		135	
9–11	X	1/1/1/4	2:2	**Sandy Silt**: olive gray (5Y 4/1), fine grained, poorly graded, sub-round, very soft, non-plastic, moist; 0.3' color change, increase in grain size, interlayers of medium grained sand, slightly laminated sand layer at 1.5'. (ML)		
11–13	X	3/4/4/5	2:2	**Silty Sand**: dark yellowish brown (10YR 4/2), fine to medium grained, poorly graded, sub-round, very soft, non-plastic, moist; sandy interlayers, well defined breaks, organics, high silt content, last 3" are medium grained sand. (SM)	130	
13–15	X	2/3/4/3	2:2	**Gravelly Sand**: pale yellowish brown (10YR 6/2), fine grained to fine gravel, poorly to moderately graded, sub-round, very soft, non-plastic, moist; sand with pebbles and fines, about 40% fine gravel. (SP)		Water Level at 15.25' BGS. No samples collected below water table.
				Silty Sand: pale yellowish brown (10YR 6/2), fine grained to fine gravel, moderately graded, sub-round, very soft, non-plastic, wet; sandy. (SM)	125	
20						
					120	
25						

****NOTES****

FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface

ppm = parts per million

LOG OF DRILLING OPERATIONS

PROJECT Galena Stage 3 RI/FS LOCATION Galena AFS Area, Alaska

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description Color, Texture, Moisture, etc.	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
30							
						110	
35							
						105	
							End of Borehole at 38.5' BGS

RADIAN CORPORATION

LOG OF DRILLING OPERATIONS

Soil Boring #: 10-SB-04

PROJECT: Galena Stage 3 RI/FS — LOCATION: Galena AFS Area, Alaska
TOTAL DEPTH: 12.00 — START DATE: 8/12/93 14:10 — FINISH DATE: 8/12/93 15:30
GEOLOGIST: B. J. Coel — APPROVED BY: S. T. Auger — R.G.#: 275 - Alaska
DRILLING COMPANY: 11 CEOS/CEOR — DRILLER: E. Miles
DRILLING METHOD: Hollow Stem Auger — EQUIPMENT: CME - 850
DRILL BIT TYPE AND SIZE: 4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head
BORING LOCATION (ST. ADDRESS OR DESCRIPTION): New Vehicle Maintenance Building (NVMB)

Depth Below Surface (ft)	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Elevation (ft MSL)	Additional Data and Comments
0	1/5/6/6	1:2	Gravelly Sand: olive (5Y 4/4), fine grained, well graded, sub-round, very soft, non-plastic, dry. (SW)	141.51	BG = 1 ppm, BZ = 1 ppm, BH = 5 ppm, HS = 128 ppm. Collected sample 10-SB-04-01.
2				140	
3	1/1/2/2	1.5:2	Clayey Silt: dark olive gray (5Y 3/2), very fine grained, poorly graded, soft, medium plasticity, moist; trace wood chips, top 2" are sandy gravel, as above. (ML)	138	BZ = 1 ppm, BH = 7 ppm, HS = 4 ppm (small sample). Collected sample 10-SB-04-02.
4					
6				136	
7	1/2/4/4	2:2	Sand: olive (5Y 3/2), fine grained, poorly graded, sub-angular, very soft, non-plastic, moist; trace clay stringers, top 2" silty sand transition from above. (SP)	134	BZ = 1 ppm, BH = 7 ppm, HS = 8 ppm. Collected sample 10-SB-04-03.
8					
10	1/2/3/4	1:2	Sand: olive (5Y 4/3), fine grained, poorly graded, sub-angular, very soft, non-plastic, moist; top 1" is a silty clay layer. (SP)	132	BZ = 1 ppm, HS = 3 ppm, BH = 4 ppm. Collected sample 10-SB-04-04.
12				130	End of Borehole at 12' BGS.

****NOTES****
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface
ppm = parts per million

RADIAN CORPORATION

Soil Boring #: 10-SB-05

LOG OF DRILLING OPERATIONS

PROJECT	Galena Stage 3 RI/FS	LOCATION	Galena AFS Area, Alaska
TOTAL DEPTH	13.00	START DATE	8/13/93 10:40
FINISH DATE	8/13/93 12:25		
GEOLOGIST	B. J. Coel	APPROVED BY	S. T. Godard
R.G.#	275 - Alaska		
DRILLING COMPANY	11 CEOS/CEOR	DRILLER	E. Miles
DRILLING METHOD	Hollow Stem Auger	EQUIPMENT	CME - 850
DRILL BIT TYPE AND SIZE	4 1/4" ID H.S.A. with 8 1/4" OD Cutter Head		
BORING LOCATION (ST. ADDRESS OR DESCRIPTION)	NVMB - Northwest corner of Building 1572.		

Depth Below Surface (ft)	Sample Interval	Blow Count	Recovery Ratio (in feet)	Lithologic Description (Color, Texture, Moisture, etc.)	Graphic Log	Elevation (ft MSL)	Additional Data and Comments
0	X	2/2/4/6	1.5:2	Gravelly Sand: olive (5Y 4/4), fine grained, well graded, sub-angular, very soft, non-plastic, dry; trace wood, strong hydrocarbon odor. (SW)		142.76	BG = 1 ppm, BZ = 1 ppm, BH = 150 ppm. Collected sample 10-SB-05-01.
3	X	2/2/4/4	1.5:2	Clayey Silt: very dark gray (5Y 3/1), very fine grained, poorly graded, soft, medium plasticity, moist; abundant wood chips, sandy for top 6", hydrocarbon odor, oxidation zones, gravel at top. (ML)			BH = 34 ppm, BZ = 1 ppm. Collected sample 10-SB-05-02.
5	X	2/4/4/5	2:2	Silty Clay: very dark gray (5Y 3/1), very fine grained, poorly graded, soft, high plasticity, moist; grades to sticky clay in next 2 foot interval, no oxidation, hydrocarbon odor. (CL)			BH = 38 ppm, BZ = 1 ppm. Collected sample 10-SB-05-DS-02.
8	X	2/4/4/5	2:2	Sand: dark olive gray (5Y 3/2), fine grained, poorly graded, sub-angular, soft, non-plastic, moist; very homogeneous fine sand, strong hydrocarbon odor. (SP)			BH = 103 ppm, BZ = 5 ppm, HS = 349 ppm. Collected sample 10-SB-05-03.
11	X	1/2/2/3	1.5:2	Sand: dark olive gray (5Y 3/2), fine grained, poorly graded, sub-angular, soft, non-plastic, moist; very homogeneous sand, as above, strong hydrocarbon odor. (SP)			BH = 23 ppm, BZ = 5 ppm, HS = 515 ppm. Collected sample 10-SB-05-04.
13							End of Borehole at 13' BGS.

NOTES

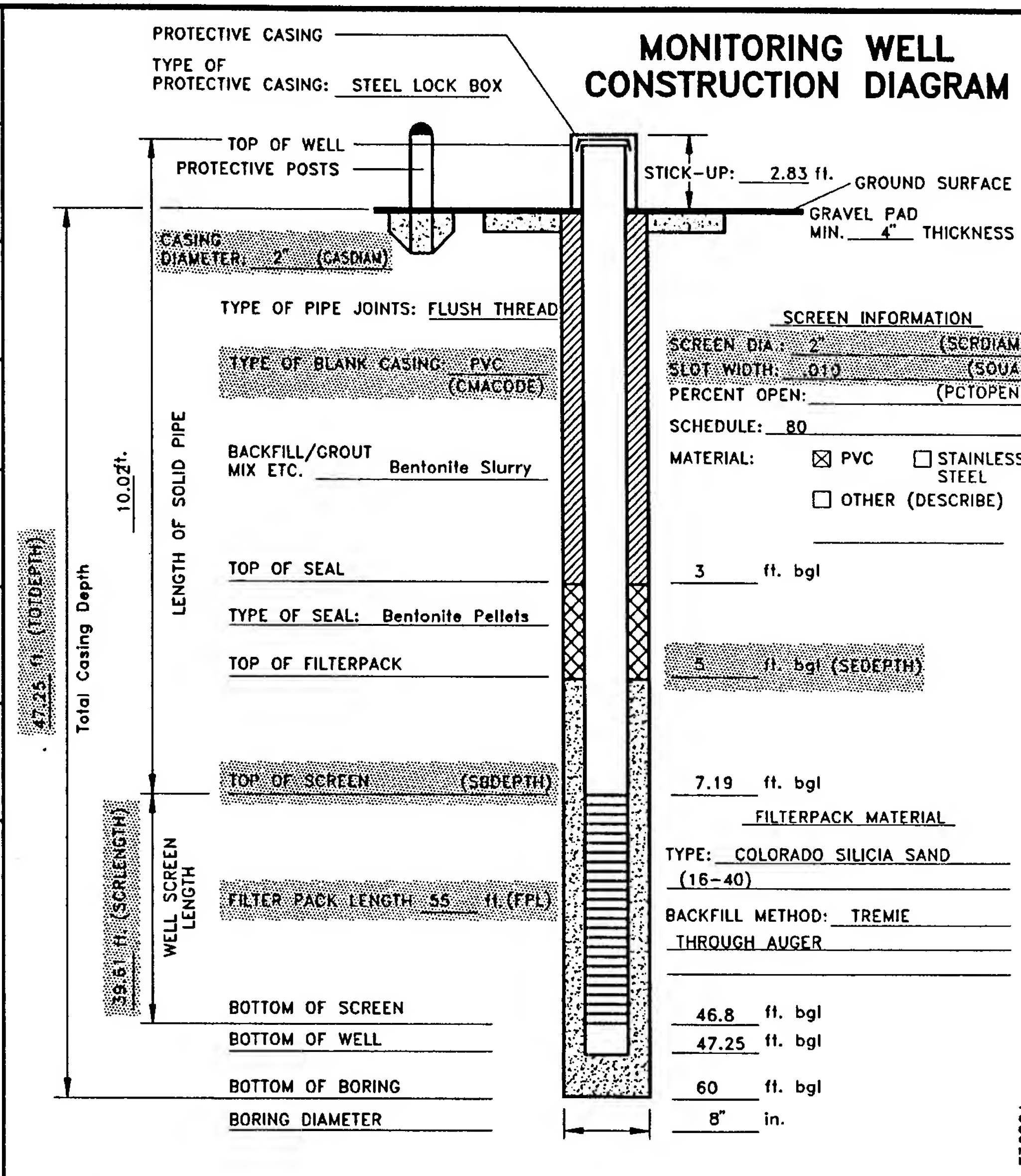
FID Data: BoreHole, Breathing Zone, HeadSpace, & BackGround. BGS = Below Ground Surface

ppm = parts per million

1992 Monitoring Well Construction Diagrams

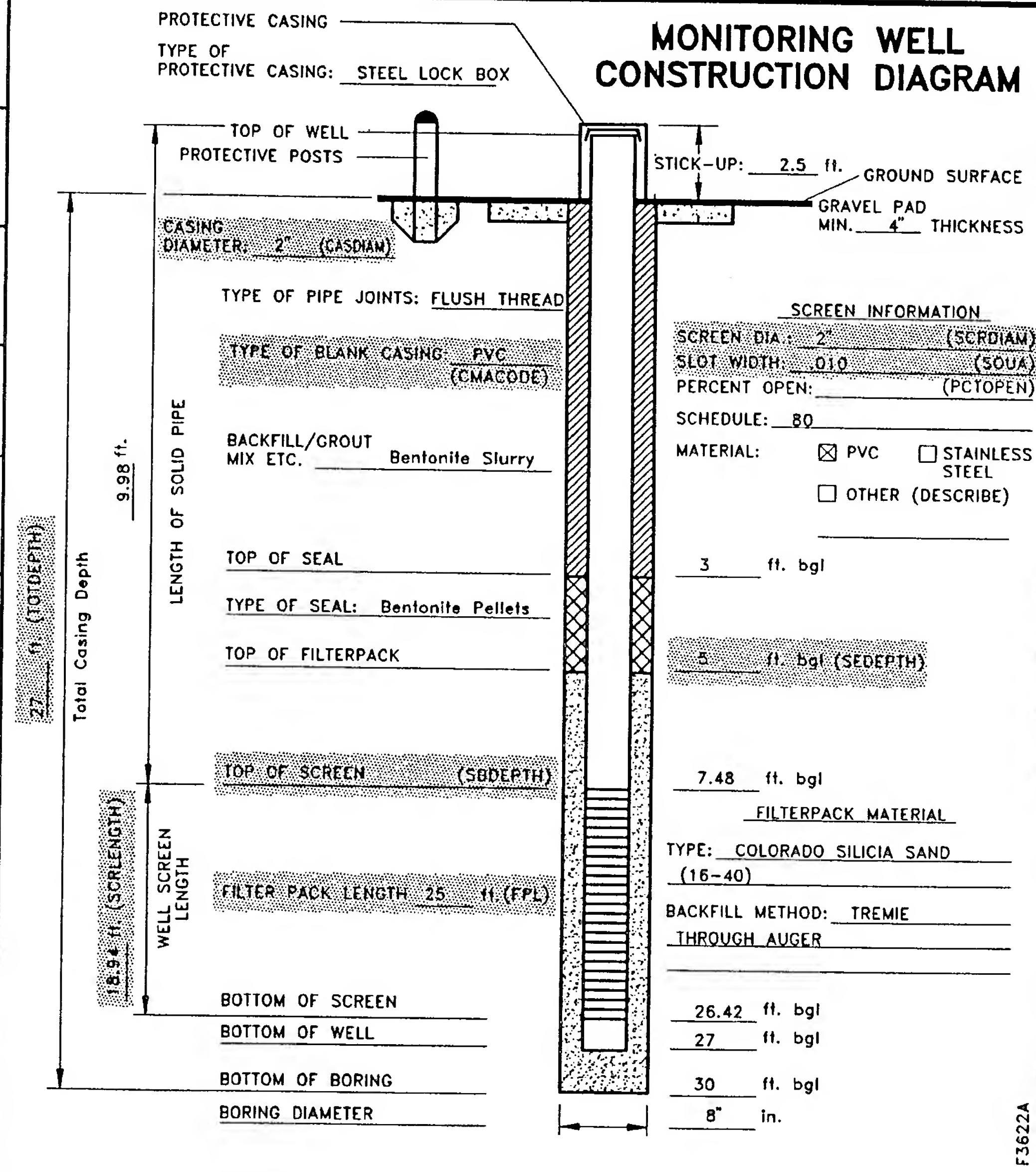
Project (PROJID) GALNA	Well I.D. (LOCID) 01-MW-01
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer PAC	Date Started (INSDATE) 08/03/92 — Date Completed 08/03/92
Location Coordinates: (NCORD) (North) 3925416	(ECORD) (East) 1811198
Elevation Top of Casing (MPELV) 145.93	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) —	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



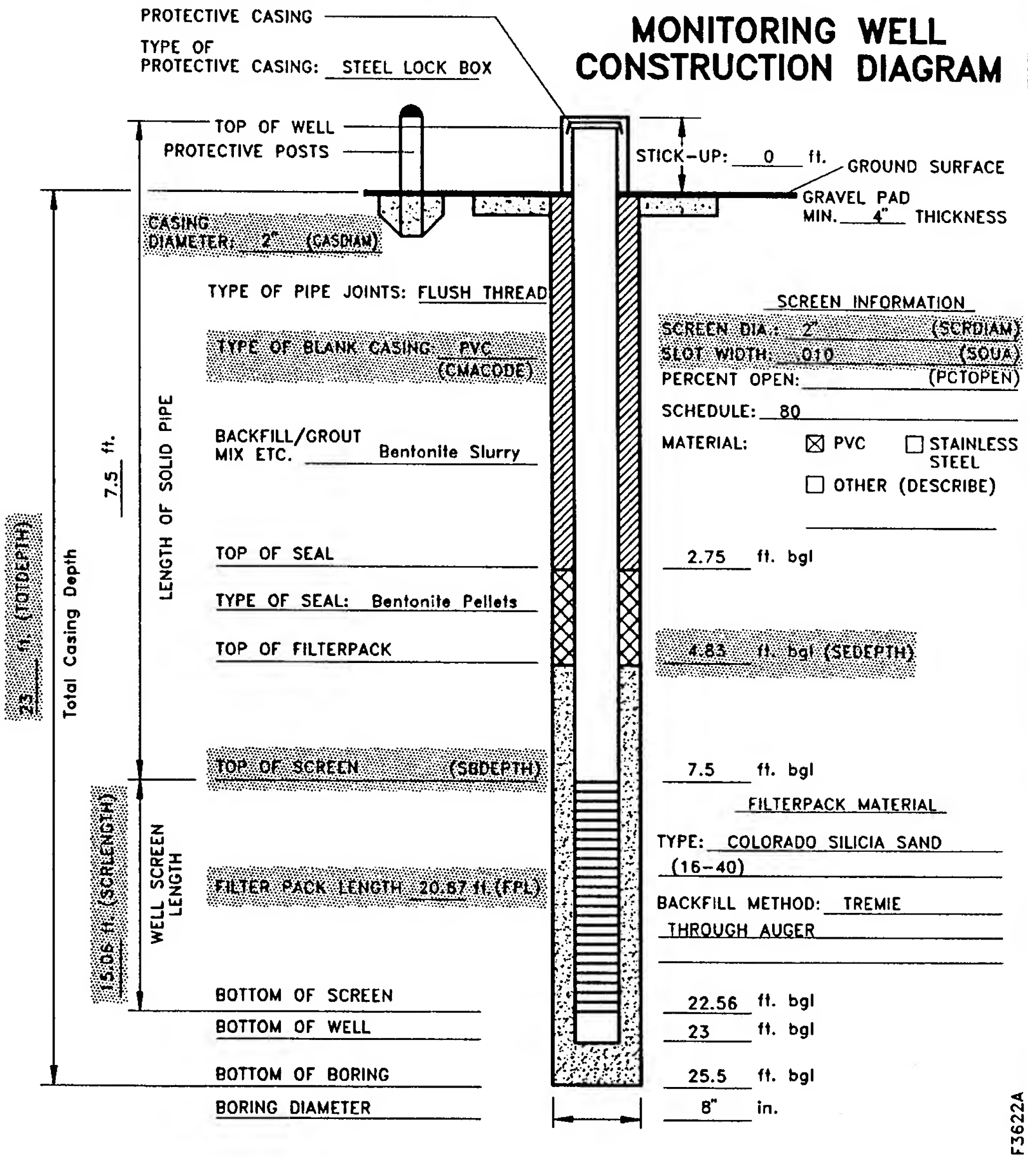
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID) GALNA	Well I.D. (LOCID) 01-MW-02
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer PAC	Date Started (INSDATE) 08/06/92 — Date Completed 08/06/92
Location Coordinates: (NCORD) (North) 3925632	(ECORD) (East) 1811355
Elevation Top of Casing (MPELV) 145.47	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	



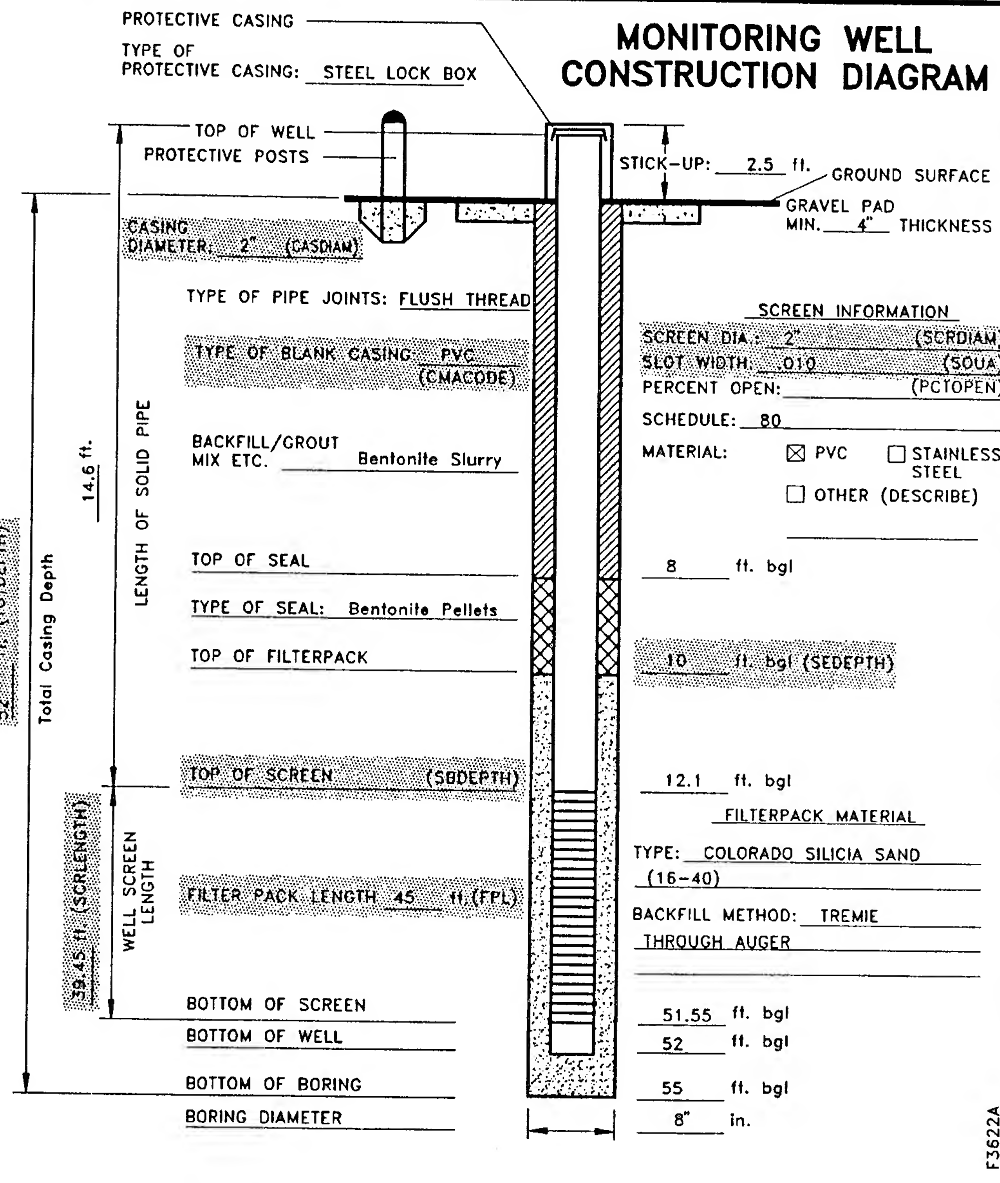
Project (PROJID) GALNA	Well I.D. (LOCID) 04-MW-03
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer RVP	Date Started (INSDATE) 08/14/92 — Date Completed 08/14/92
Location Coordinates: (NCORD) (North) 3925460	(ECORD) (East) 1812402
Elevation Top of Casing (MPELV) 145.5	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) —	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



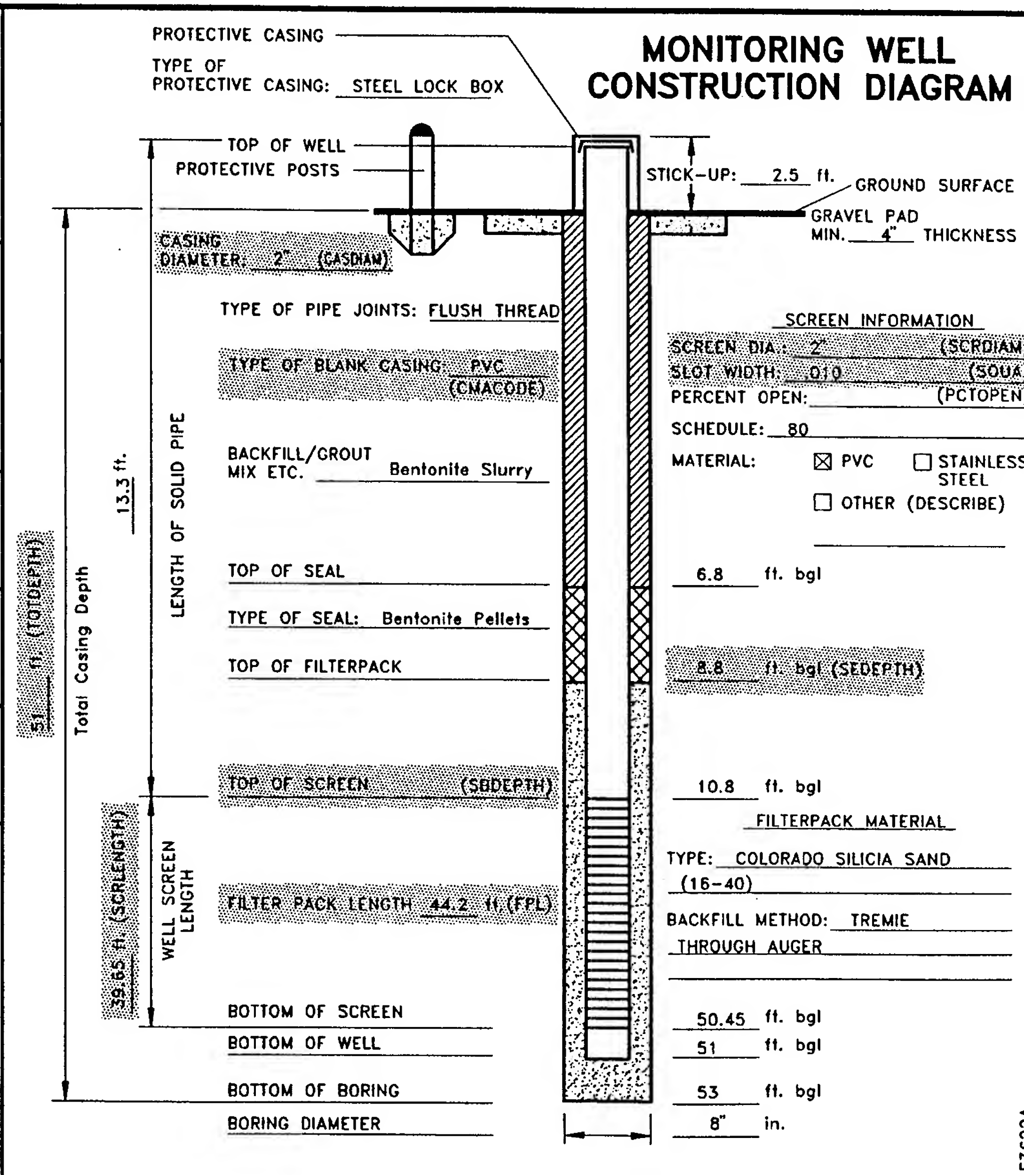
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID): GALNA	Well I.D. (LOCID): 05-MW-01
Well Owner (VVL WELCODE): USAF	Well Type (WL WTCODE): MNW
Installer: KLC	Date Started (INSDATE): 07/21/92 — Date Completed: 07/21/92
Location Coordinates: (NCORD) (North) 3926266	(ECORD) (East) 1804906
Elevation Top of Casing (MPELV): 150.66	Completion Method (VVL WCMCODE): GS
Sole Source Aquifer Code (VVL SAQCODE): –	
Drilling Method: HS	Completion Zone (VVL GZCODE): W
Remarks (REMARKS):	



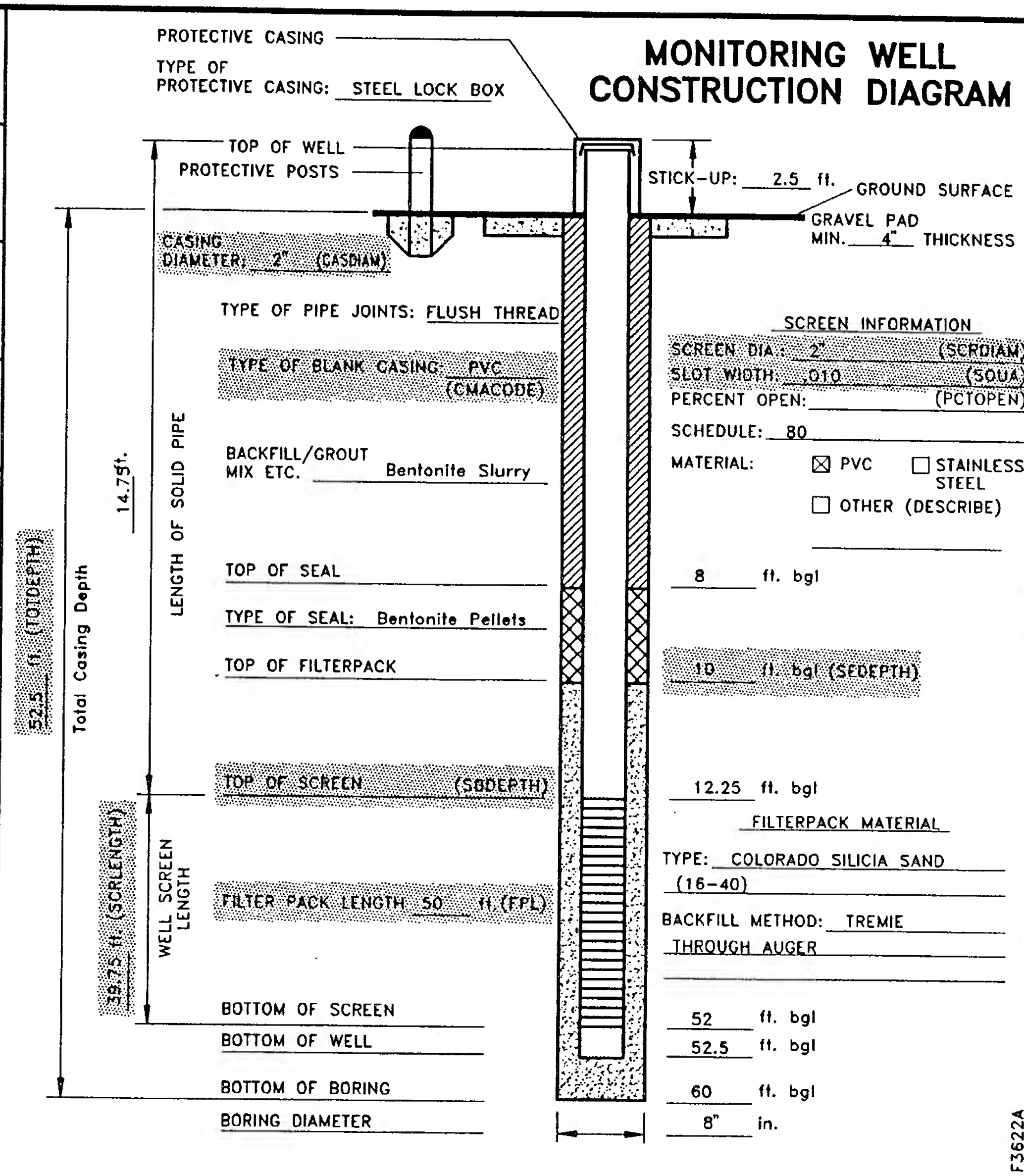
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID) GALNA	Well I.D. (LOCID) 05-MW-02
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer BJC	Date Started (INSDATE) 07/23/92 — Date Completed 07/23/92
Location Coordinates: (NCORD) (North) 3925967	(ECORD) (East) 1805429
Elevation Top of Casing (MPELV) 149.55	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	



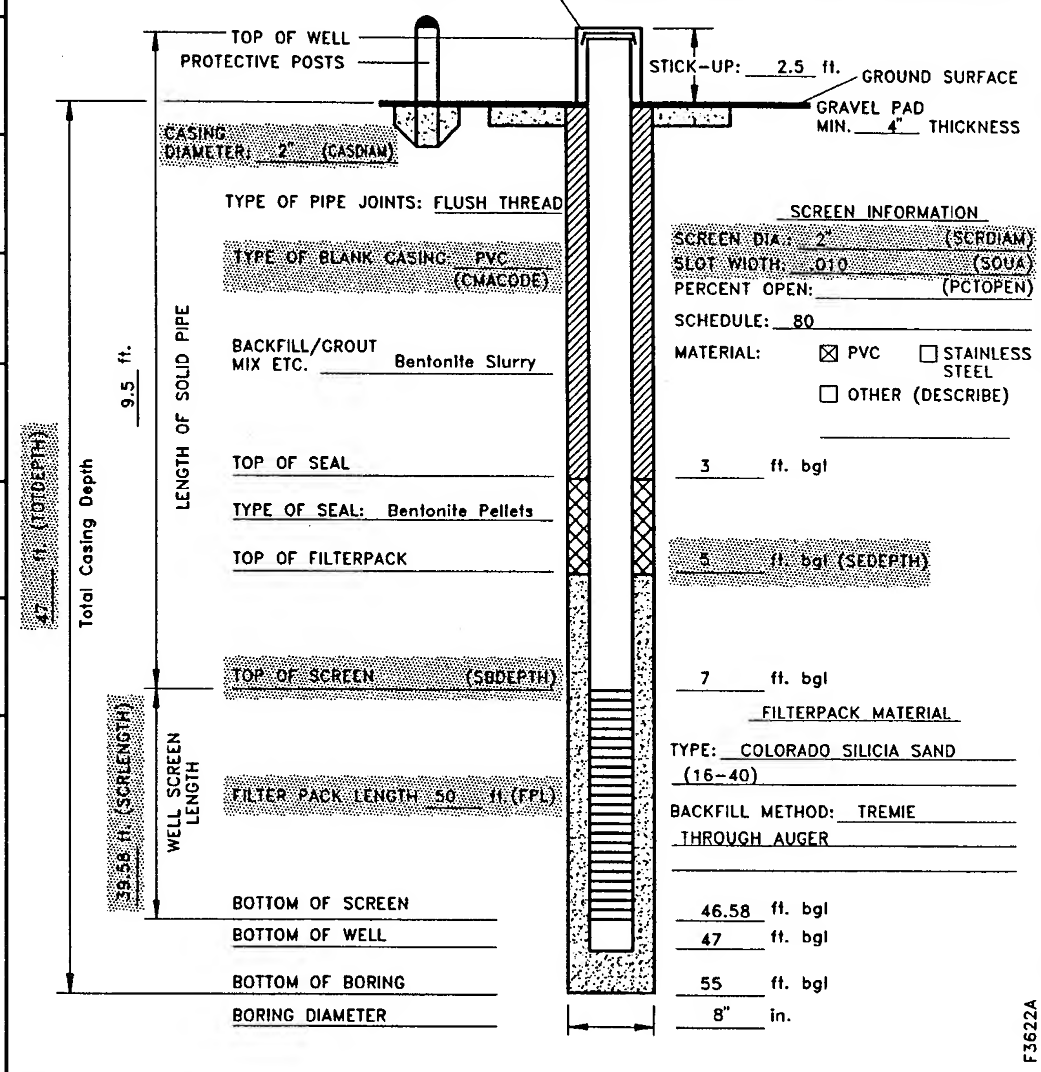
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID) GALNA	Well I.D. (LOCID) 05-MW-03
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer GSC	Date Started (INSDATE) 07/22/92 — Date Completed 07/22/92
Location Coordinates: (NCORD) (North) 3926037	(ECORD) (East) 1805184
Elevation Top of Casing (MPELV) 147.97	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	



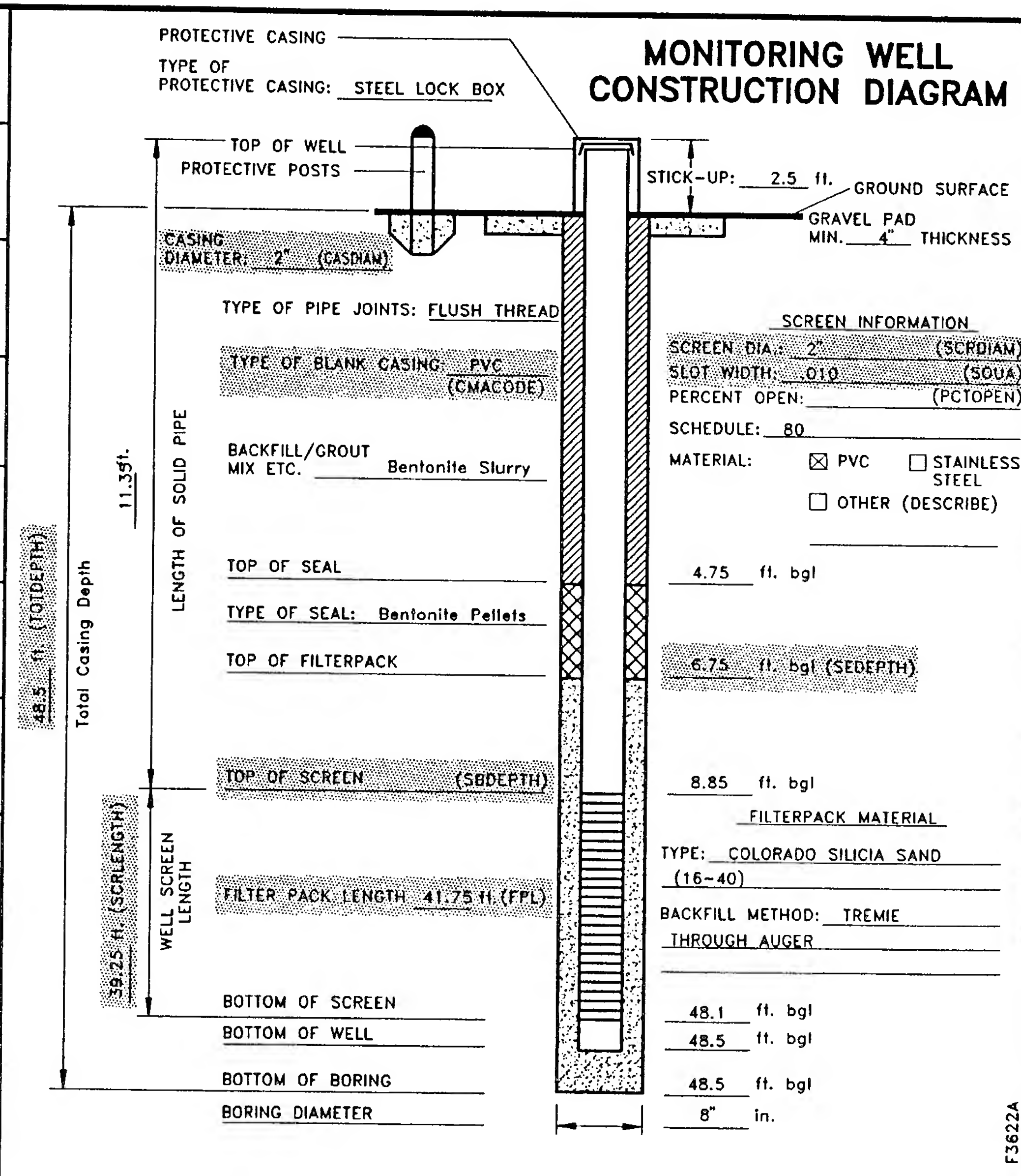
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	05-MW-04	
Well Owner (VVL WELCODE)	**Well Type (WL WTCODE)**	
USAF	MNW	
Installer	**Date Started (INSDATE)**	**Date Completed**
PAC	07/30/92	07/30/92
Location Coordinates: (NCORD) (North) 3926029	(ECORD) (East) 1805030	
Elevation Top of Casing (MPELV)	**Completion Method (VVL WCMCODE)**	
145.84	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
–		
Drilling Method	**Completion Zone (VVL GZCODE)**	
HS	W	
Remarks (REMARKS)		



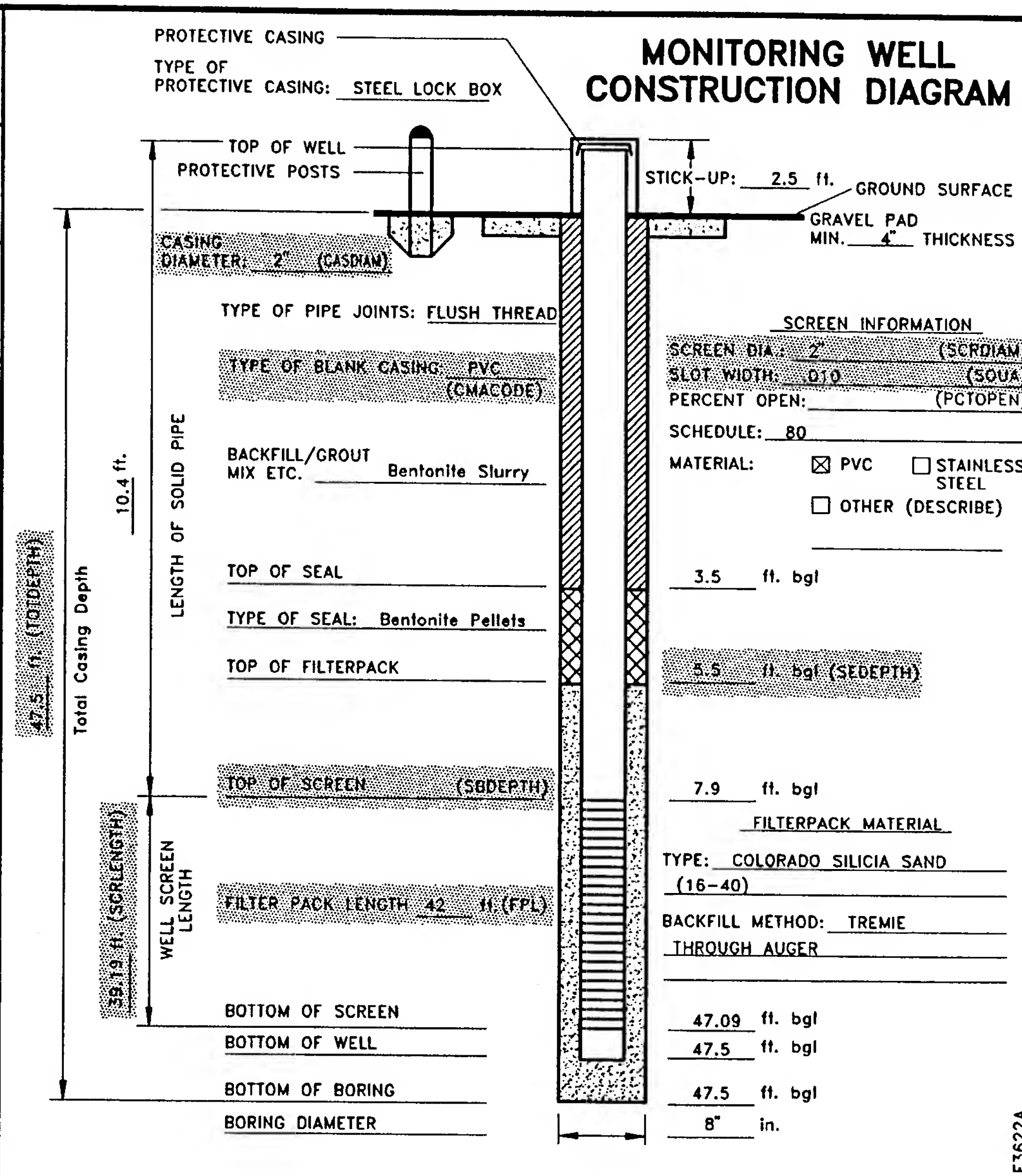
Project (PROJID) GALNA	Well I.D. (LOCID) 05-MW-05
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer BJC	Date Started (INSDATE) 07/31/92 — Date Completed 07/31/92
Location Coordinates: (NCORD) (North) 3925970	(ECORD) (East) 1804904
Elevation Top of Casing (MPELV) 145.58	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



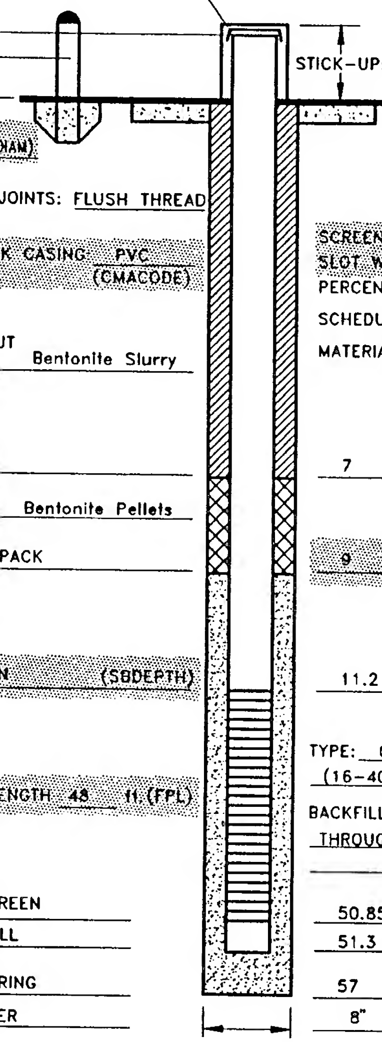
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	05-MW-06	
Well Owner (VVL WELCODE)	**Well Type (WL WTCODE)**	
USAF	MNW	
Installer	**Date Started (INSDATE)**	**Date Completed**
PAC	08/01/92	08/01/92
Location Coordinates: (NCORD) (North)	**(ECORD) (East)**	
3926176	1804529	
Elevation Top of Casing (MPELV)	**Completion Method (VVL WCMCODE)**	
144.58	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
–		
Drilling Method	**Completion Zone (VVL GZCODE)**	
HS	W	
Remarks (REMARKS)		



Project (PROJID) GALNA	Well I.D. (LOCID) 06-MW-01
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer KLC/GJC	Date Started (INSDATE) 07/18/92 — Date Completed 07/18/92
Location Coordinates: (NCORD) (North) 3926640	(ECORD) (East) 1803589
Elevation Top of Casing (MPELV) 151.3	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: STEEL LOCK BOX

TOP OF WELL

PROTECTIVE POSTS

STICK-UP: 2.6 ft.

GROUND SURFACE

GRAVEL PAD MIN. 4" THICKNESS

CASING DIAMETER: 2" (CASDIAM)

TYPE OF PIPE JOINTS: FLUSH THREAD

TYPE OF BLANK CASING: PVC (CMACODE)

BACKFILL/GROUT MIX ETC. Bentonite Slurry

SCREEN INFORMATION

SCREEN DIA.: 2" (SCRDIAM)

SLOT WIDTH: .010 (SOUA)

PERCENT OPEN: (PCTOPEN)

SCHEDULE: 80

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

LENGTH OF SOLID PIPE 13.55 ft.

Total Casing Depth 51.3 ft. (TOTDEPTH)

WELL SCREEN LENGTH 39.65 ft. (SCRLENGTH)

TOP OF SEAL 7 ft. bgl

TYPE OF SEAL: Bentonite Pellets

TOP OF FILTERPACK 9 ft. bgl (SEDEPTH)

TOP OF SCREEN (SBDEPTH) 11.2 ft. bgl

FILTERPACK MATERIAL

TYPE: COLORADO SILICIA SAND (16-40)

FILTER PACK LENGTH 48 ft. (FPL)

BACKFILL METHOD: TREMIE THROUGH AUGER

BOTTOM OF SCREEN 50.85 ft. bgl

BOTTOM OF WELL 51.3 ft. bgl

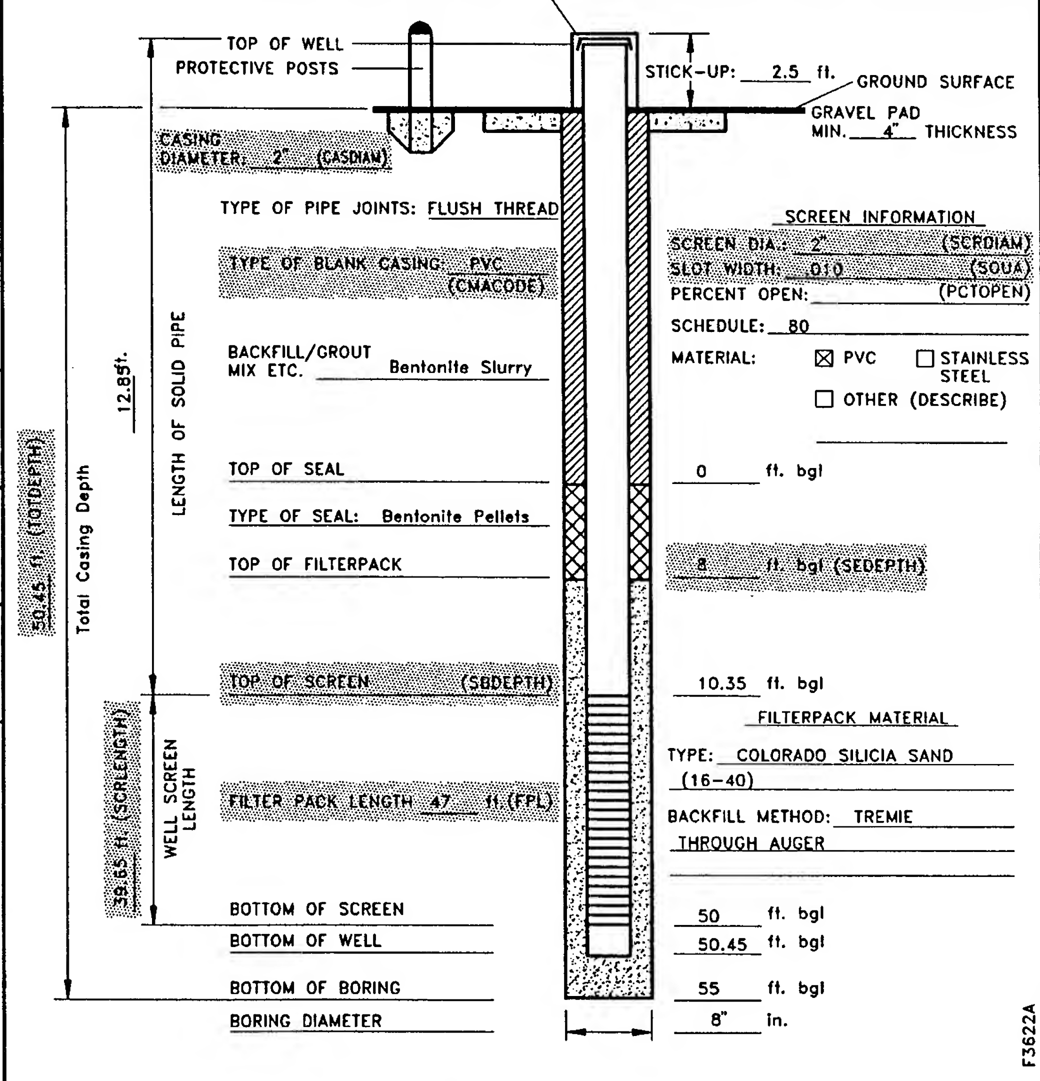
BOTTOM OF BORING 57 ft. bgl

BORING DIAMETER 8" in.

F3622A

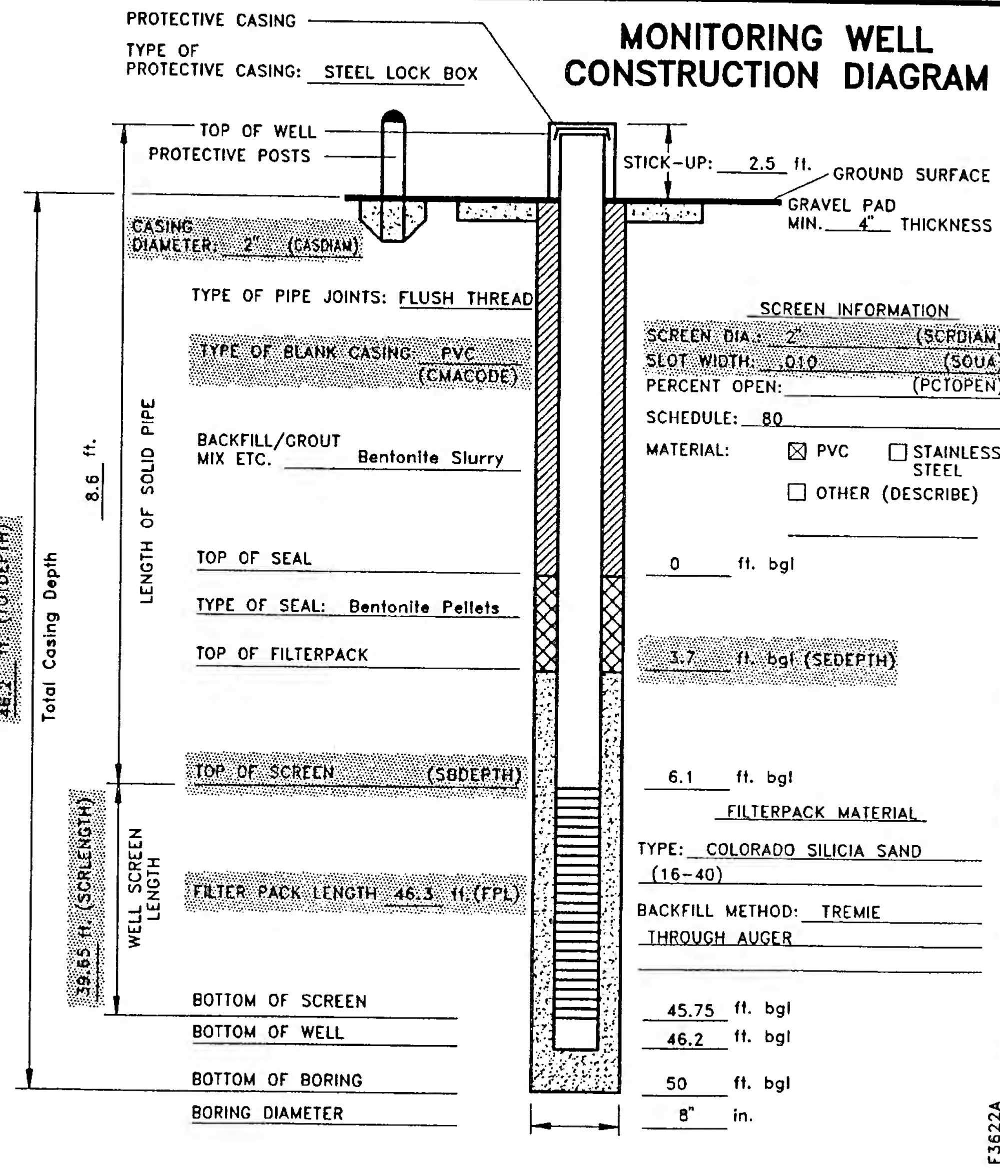
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID) GALNA	Well I.D. (LOCID) 06-MW-02
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer KLC/GJC	Date Started (INSDATE) 07/17/92 — Date Completed 07/17/92
Location Coordinates: (NCORD) (North) 3926439	(ECORD) (East) 1803544
Elevation Top of Casing (MPELV) 147.92	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	



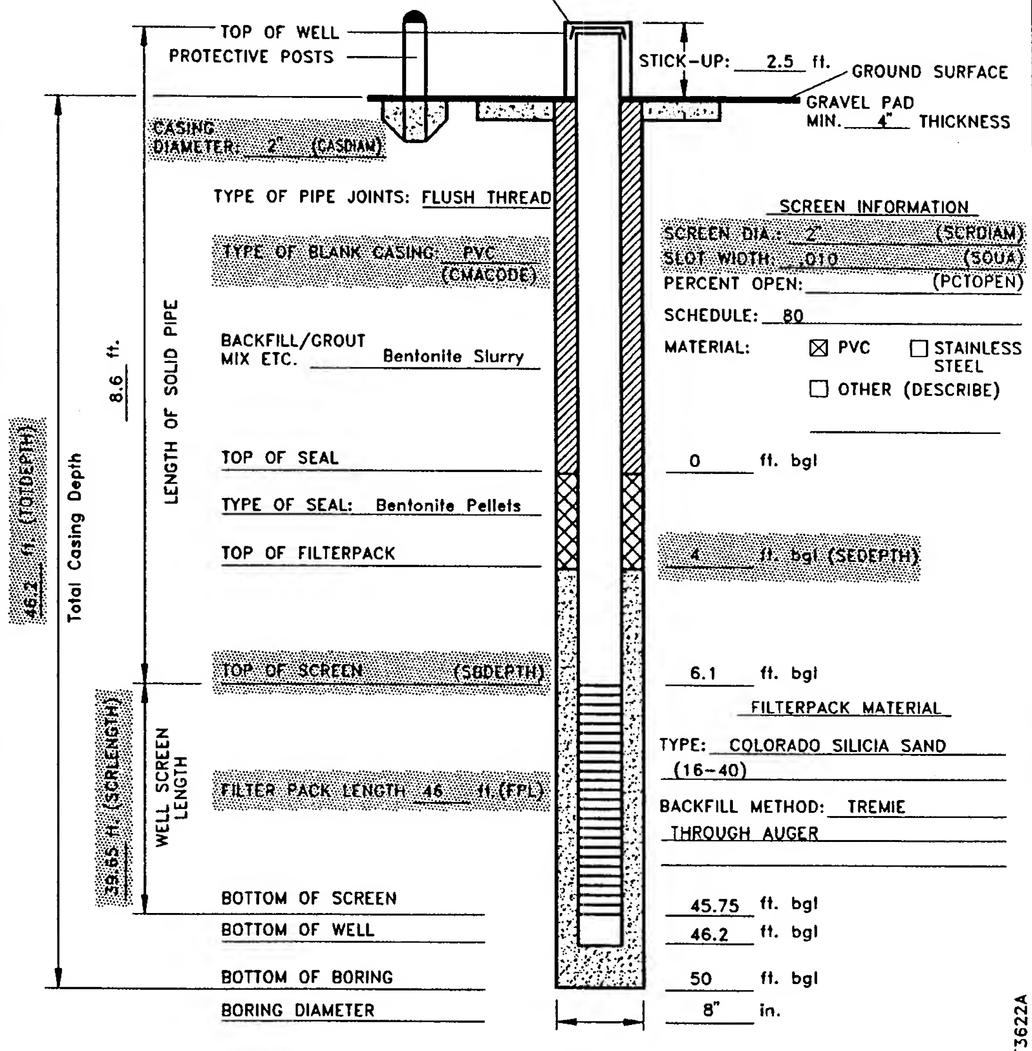
Project (PROJID): GALNA	Well I.D. (LOCID): 06-MW-03
Well Owner (VVL WELCODE): USAF	Well Type (WL WTCODE): MNW
Installer: KLC/GJC	Date Started (INSDATE): 07/14/92 — Date Completed: 07/14/92
Location Coordinates: (NCORD) (North) 3926137	(ECORD) (East) 1803301
Elevation Top of Casing (MPELV): 144.6	Completion Method (VVL WCMCODE): GS
Sole Source Aquifer Code (VVL SAQCODE): –	
Drilling Method: HS	Completion Zone (VVL GZCODE): W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



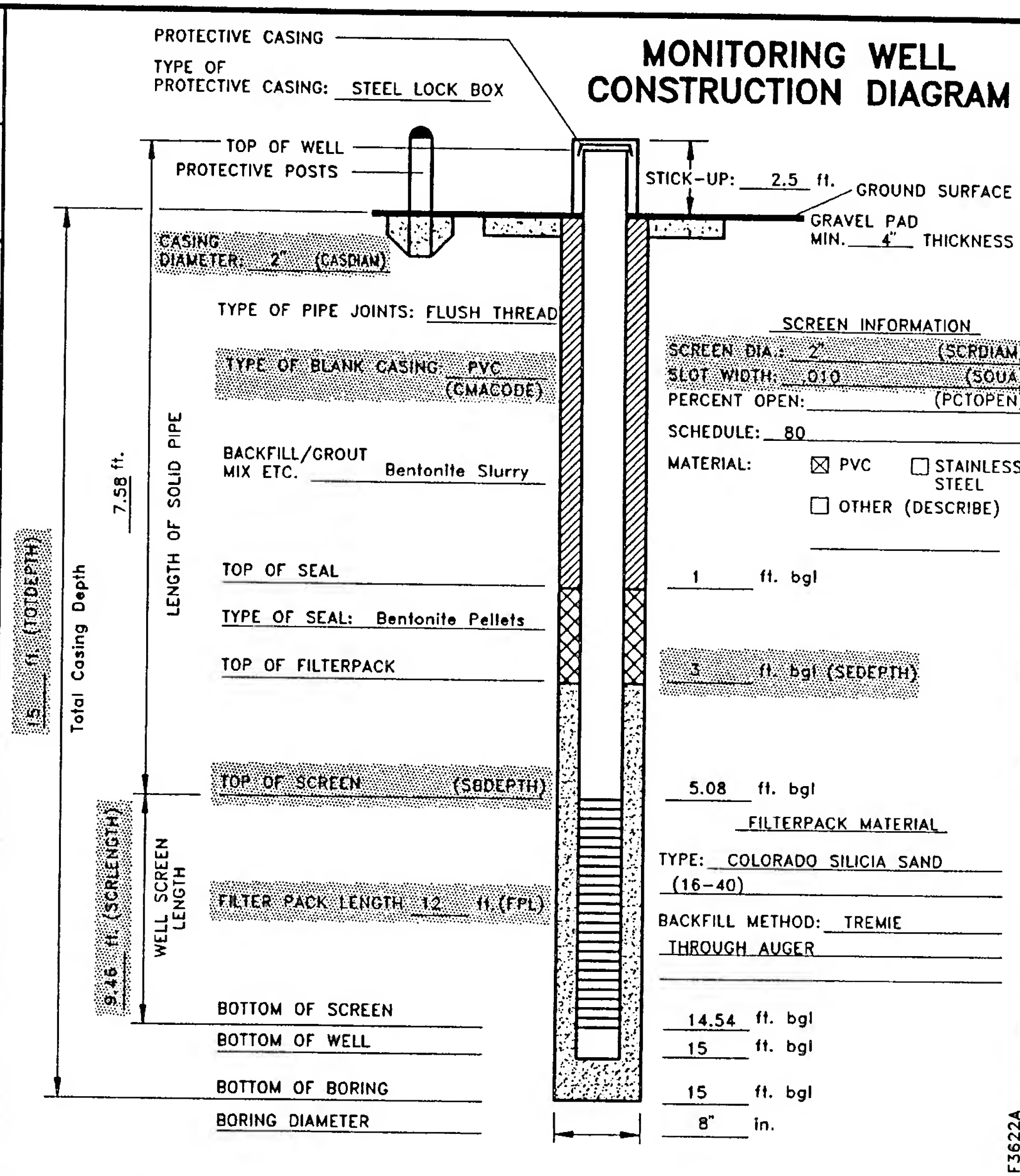
Project (PROJID) GALNA	Well I.D. (LOCID) 06-MW-04
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer KLC/GJC	Date Started (INSDATE) 07/15/92 — Date Completed 07/15/92
Location Coordinates: (NCORD) (North) 3926312	(ECORD) (East) 1803047
Elevation Top of Casing (MPELV) 142.71	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) —	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



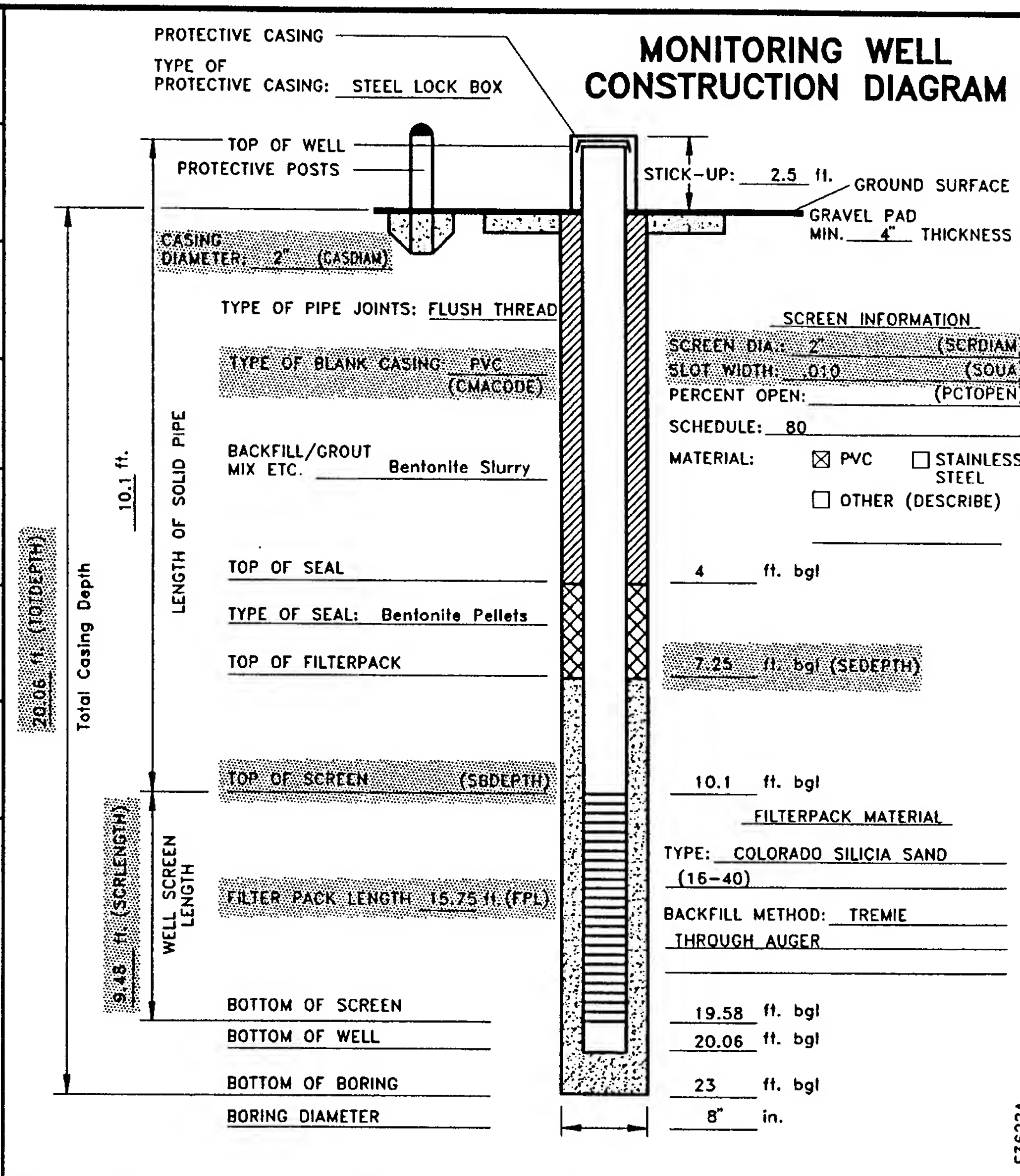
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	07-MW-01	
Well Owner (VVL WELCODE)	Well Type (WL WTCODE)	
USAF	MNW	
Installer	Date Started (INSDATE)	Date Completed
RVP	08/11/92	08/11/92
Location Coordinates: (NCORD) (North) 3914277	(ECORD) (East) 1840068	
Elevation Top of Casing (MPELV)	Completion Method (VVL WCMCODE)	
370.54	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
—		
Drilling Method	Completion Zone (VVL GZCODE)	
HS	W	
Remarks (REMARKS)		



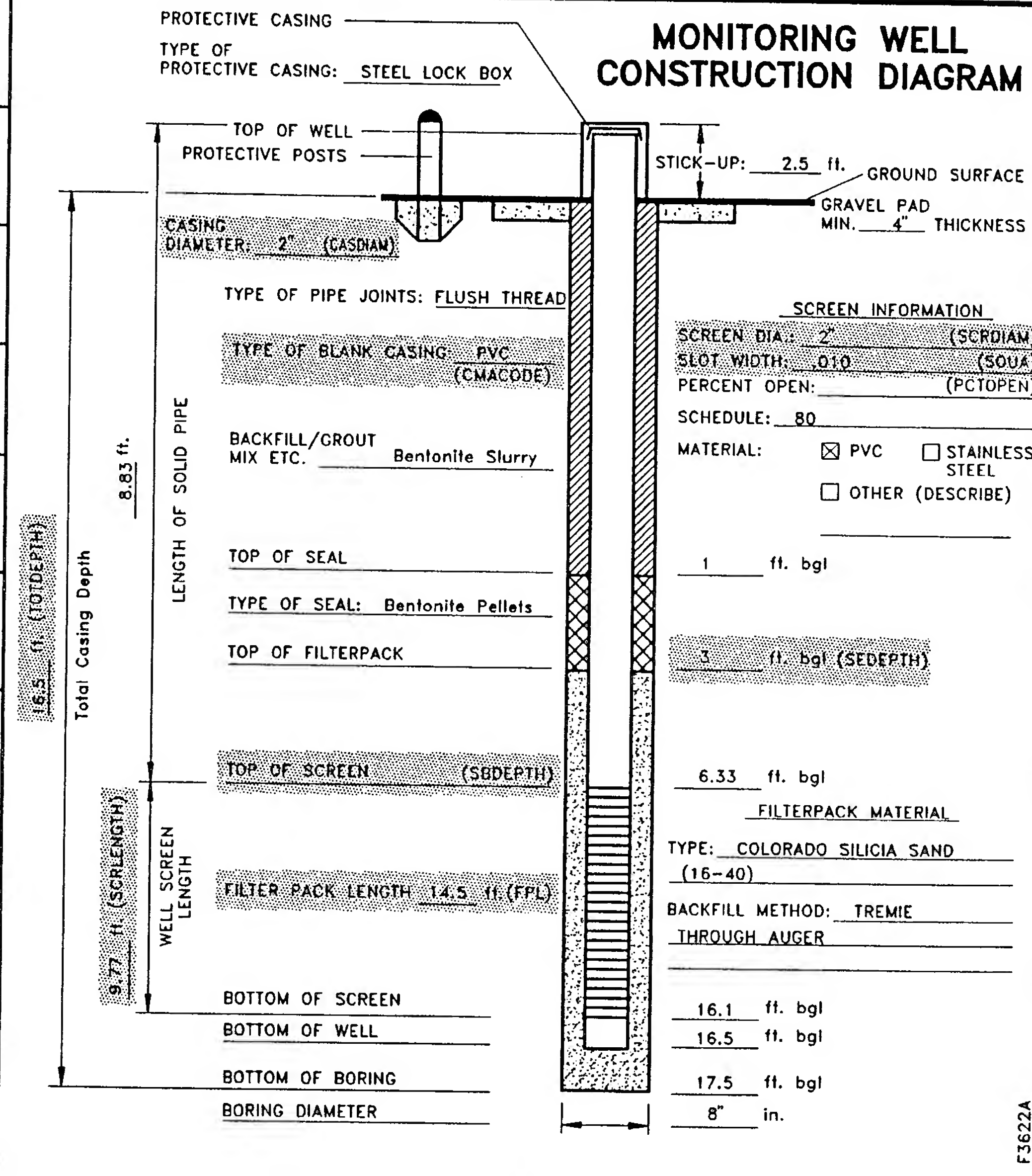
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	07-MW-02	
Well Owner (VVL WELCODE)	Well Type (WL WTCODE)	
USAF	MNW	
Installer	Date Started (INSDATE)	Date Completed
RVP	08/11/92	08/11/92
Location Coordinates: (NCORD) (North) 3914547	(ECORD) (East) 1840139	
Elevation Top of Casing (MPELV)	Completion Method (VVL WCMCODE)	
362.92	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
–		
Drilling Method	Completion Zone (VVL GZCODE)	
HS	W	
Remarks (REMARKS)		



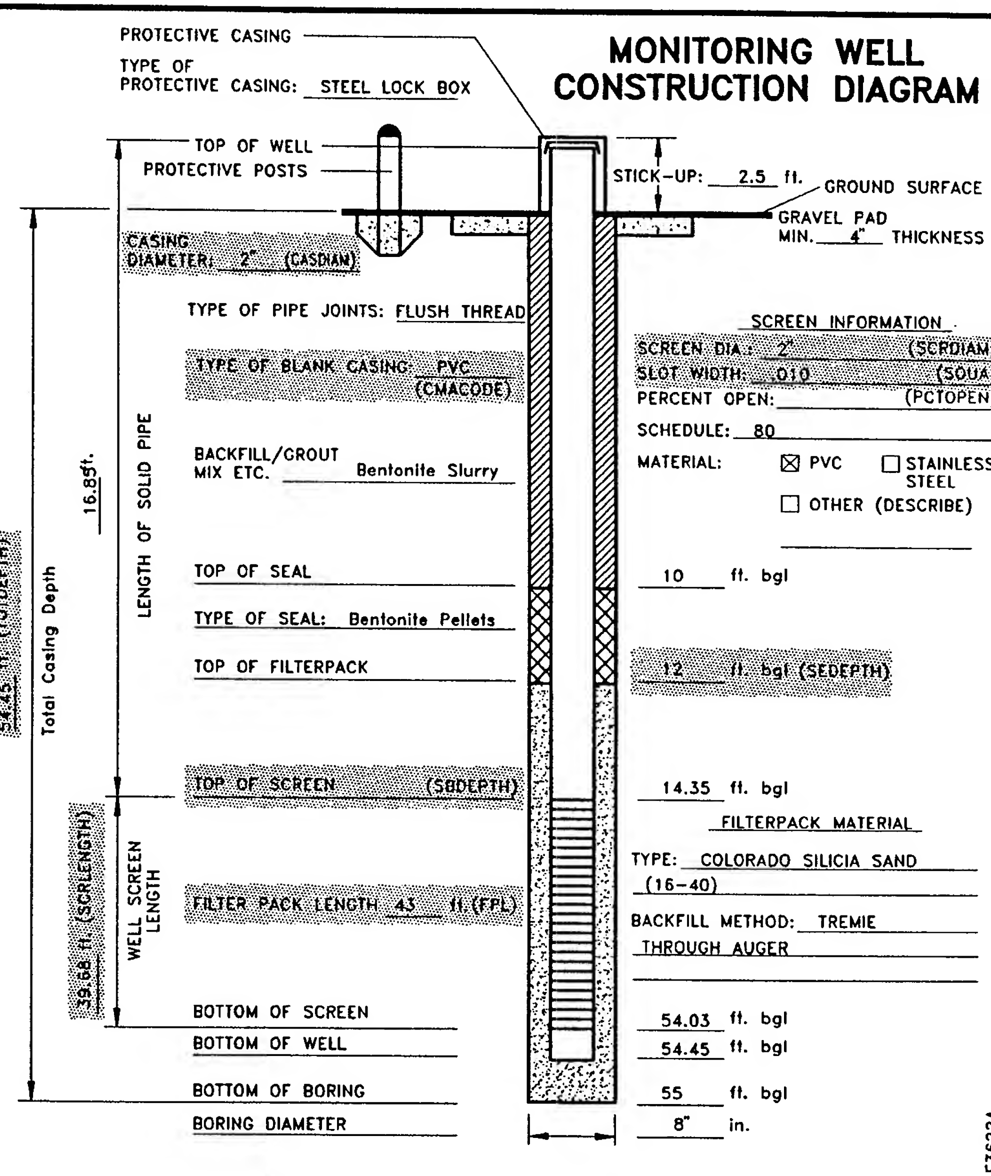
MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	07-MW-03	
Well Owner (VVL WELCODE)	**Well Type (WL WTCODE)**	
USAF	MNW	
Installer	**Date Started (INSDATE)**	**Date Completed**
RVP	08/10/92	08/10/92
Location Coordinates: (NCORD) (North)	**(ECORD) (East)**	
3914671	1839895	
Elevation Top of Casing (MPELV)	**Completion Method (VVL WCMCODE)**	
368.52	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
–		
Drilling Method	**Completion Zone (VVL GZCODE)**	
HS	W	
Remarks (REMARKS)		



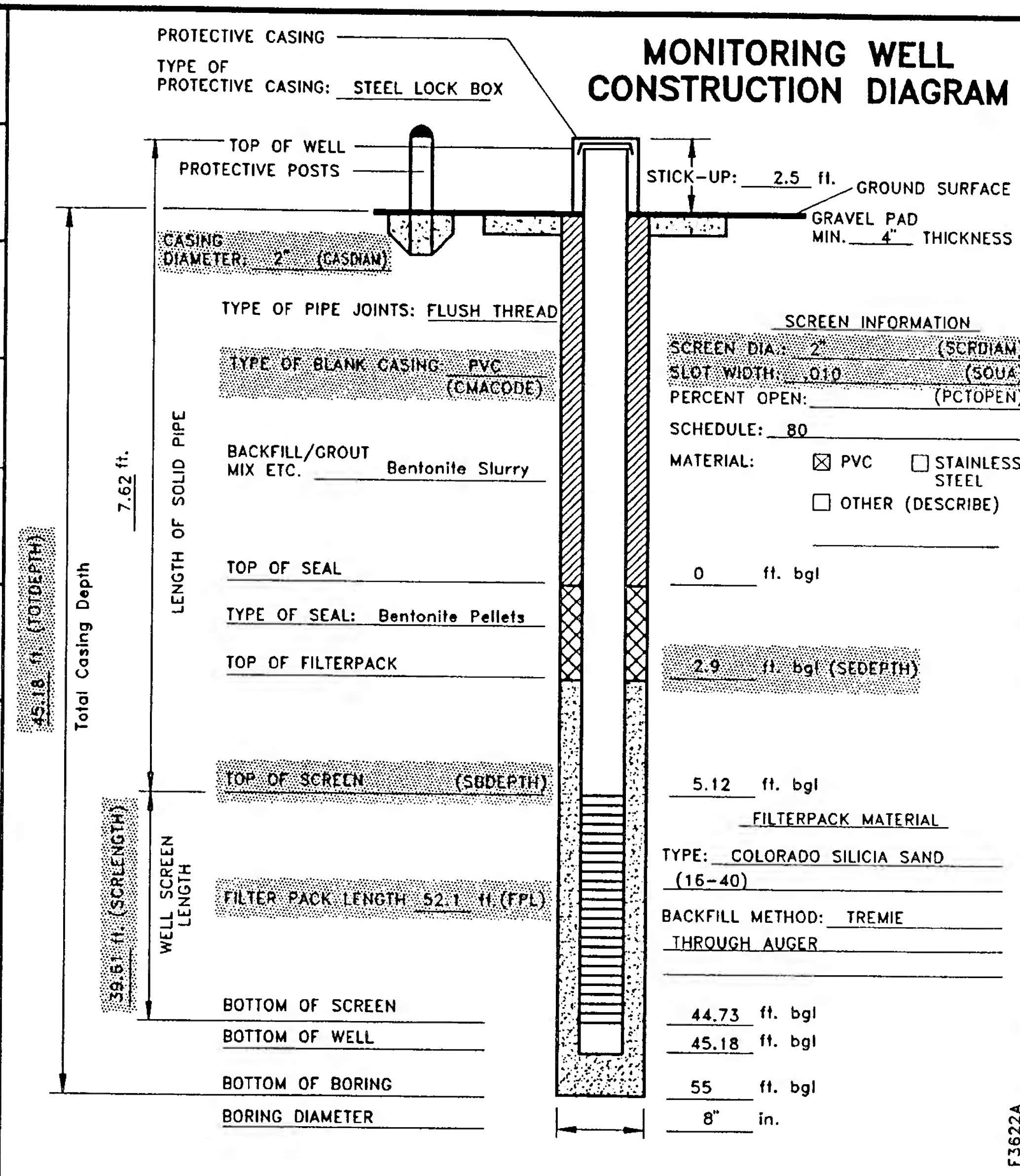
Project (PROJID) GALNA	Well I.D. (LOCID) 07-MW-04
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer RVP	Date Started (INSDATE) 08/09/92 — Date Completed 08/09/92
Location Coordinates: (NCORD) (North) 3914455	(ECORD) (East) 1839655
Elevation Top of Casing (MPELV) 390.08	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



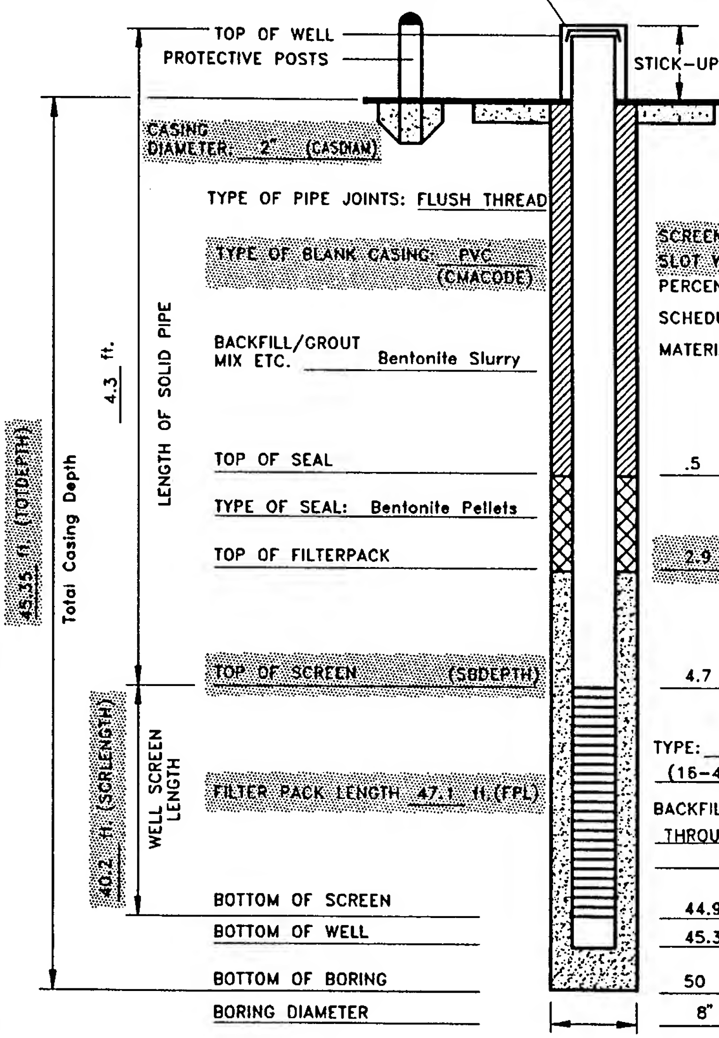
Project (PROJID) GALNA	Well I.D. (LOCID) 09-MW-01
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer TAC	Date Started (INSDATE) 07/09/92; Date Completed 07/09/92
Location Coordinates: (NCORD) (North) 3925887	(ECORD) (East) 1802988
Elevation Top of Casing (MPELV) 142.54	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



Project (PROJID)	Well I.D. (LOCID)	
GALNA	09-MW-02	
Well Owner (VVL WELCODE)	Well Type (WL WTCODE)	
USAF	MNW	
Installer	Date Started (INSDATE)	Date Completed
GSC	07/09/92	07/09/92
Location Coordinates: (NCORD) (North) 3925561	(ECORD) (East) 1802814	
Elevation Top of Casing (MPELV)	Completion Method (VVL WCMCODE)	
140.52	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
–		
Drilling Method	Completion Zone (VVL GZCODE)	
HS	W	
Remarks (REMARKS)		

MONITORING WELL CONSTRUCTION DIAGRAM



SCREEN INFORMATION
SCREEN DIA.: 2" (SCRDIAM)
SLOT WIDTH: .010 (SOUA)
PERCENT OPEN: (PCTOPEN)
SCHEDULE: 80
MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

.5 ft. bgl
2.9 ft. bgl (SEDEPTH)
4.7 ft. bgl

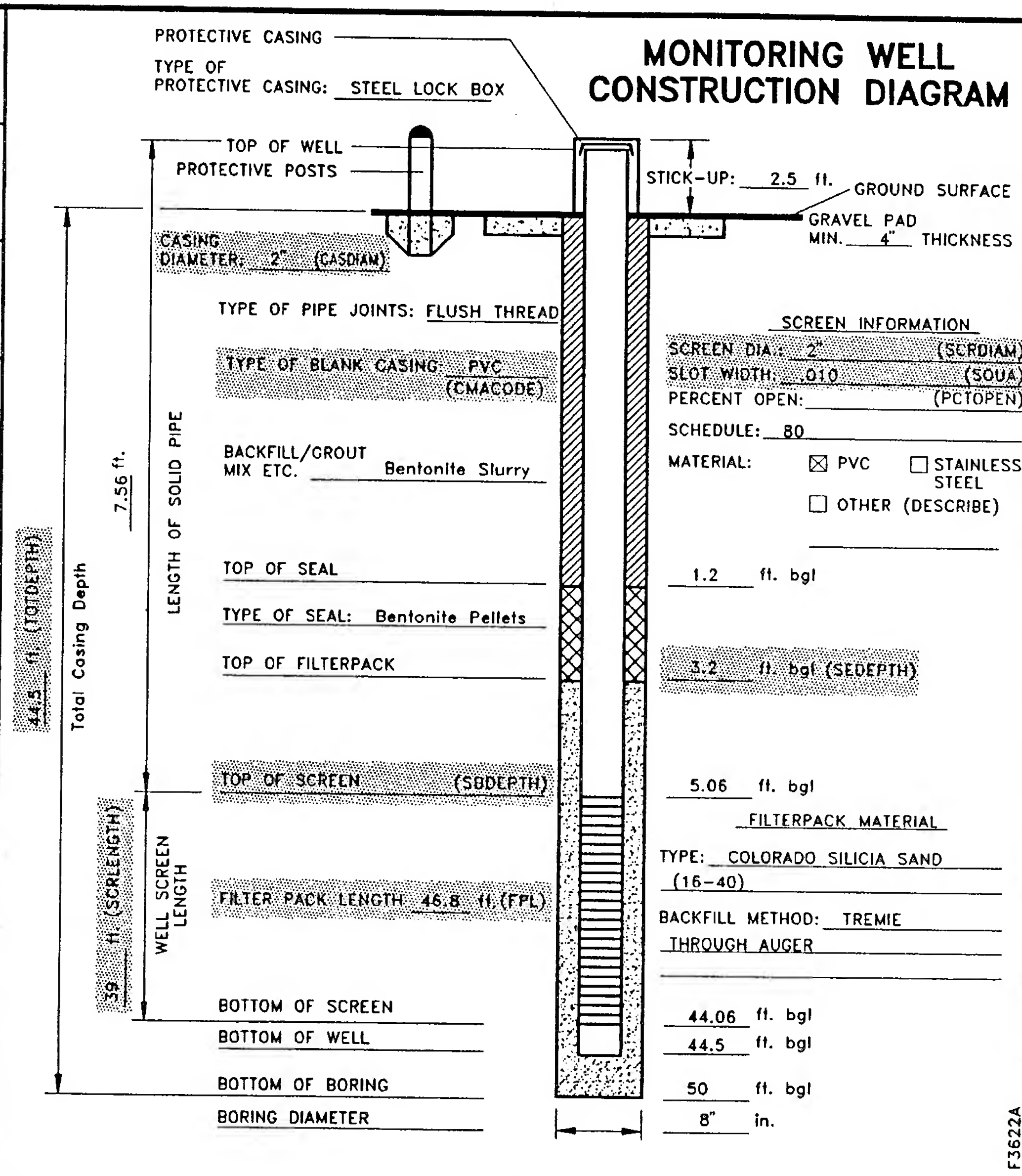
FILTERPACK MATERIAL
TYPE: COLORADO SILICIA SAND (16-40)
BACKFILL METHOD: TREMIE THROUGH AUGER

44.9 ft. bgl
45.35 ft. bgl
50 ft. bgl
8" in.

F3622A

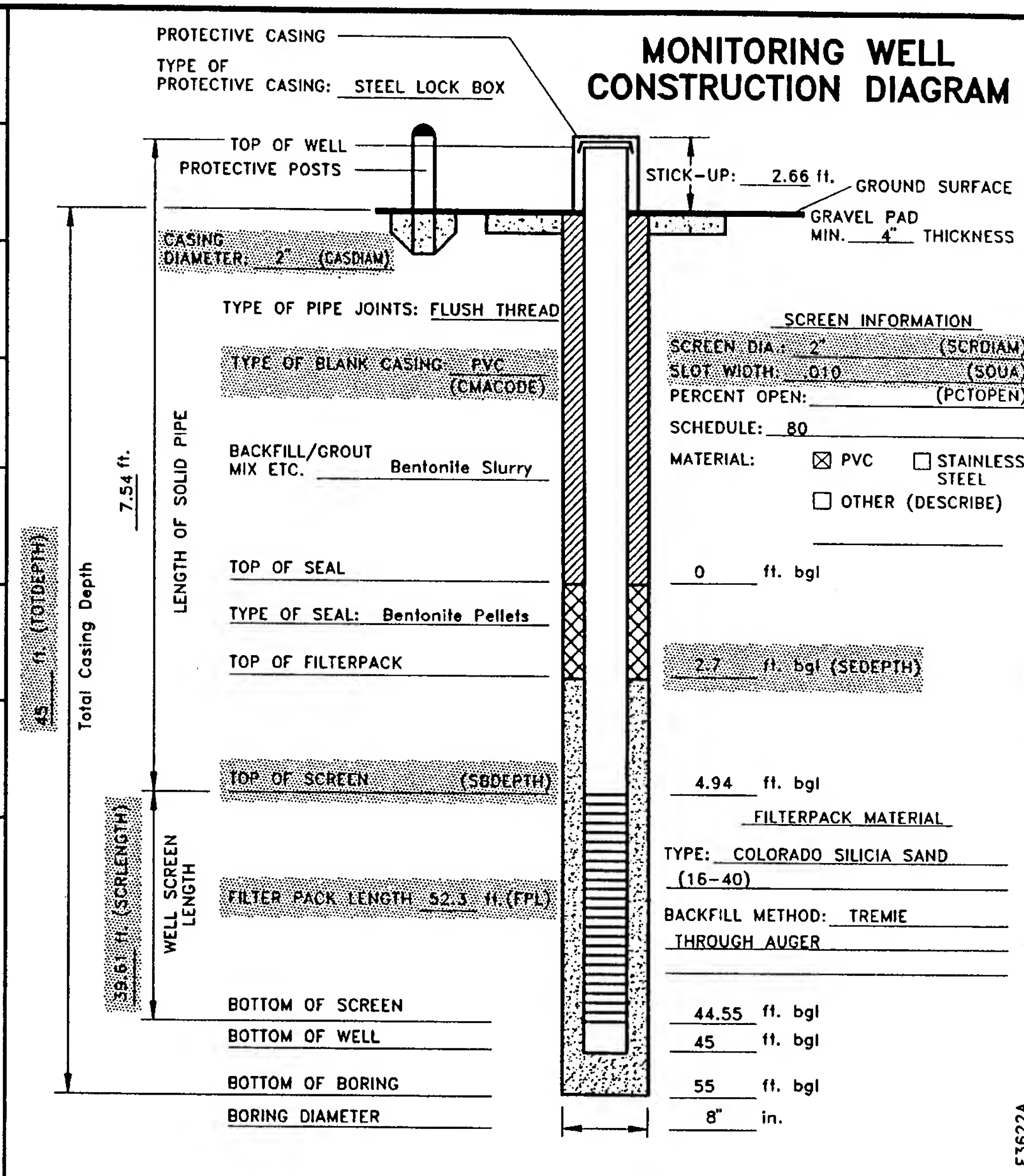
Project (PROJID) GALNA	Well I.D. (LOCID) 09-MW-03
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer RVP	Date Started (INSDATE) 08/15/92 — Date Completed 08/15/92
Location Coordinates: (NCORD) (North) 3926366	(ECORD) (East) 1802304
Elevation Top of Casing (MPELV) 143.77	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) —	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



MONITORING WELL CONSTRUCTION DIAGRAM

Project (PROJID)	Well I.D. (LOCID)	
GALNA	09-MW-04	
Well Owner (VVL WELCODE)	Well Type (WL WTCODE)	
USAF	MNW	
Installer	Date Started (INSDATE)	Date Completed
TAC	07/07/92	07/08/92
Location Coordinates: (NCORD) (North) 3926073	(ECORD) (East) 1802387	
Elevation Top of Casing (MPELV)	Completion Method (VVL WCMCODE)	
145.49	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
—		
Drilling Method	Completion Zone (VVL GZCODE)	
HS	W	
Remarks (REMARKS)		



Project (PROJID) GALNA	Well I.D. (LOCID) 09-MW-05
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW

Installer	Date Started (INSDATE)	Date Completed
RVP/TAC	08/16/92	08/16/92

Location Coordinates:
(NCORD) (North) 3926630 (ECORD) (East) 1802495

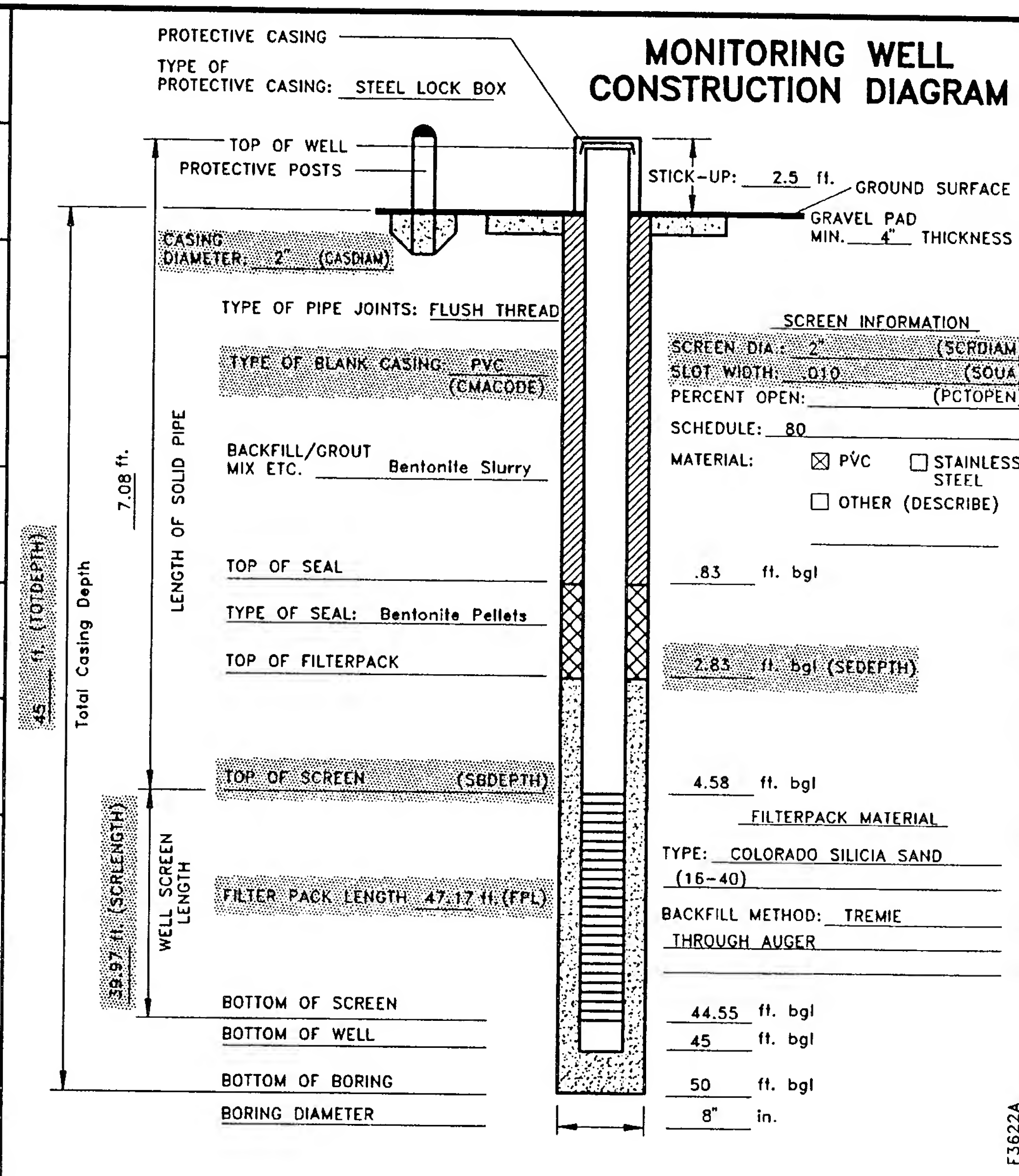
Elevation Top of Casing (MPELV) 141.24	Completion Method (VVL WCMCODE) GS

Sole Source Aquifer Code (VVL SAQCODE)
–

Drilling Method HS	Completion Zone (VVL GZCODE) W

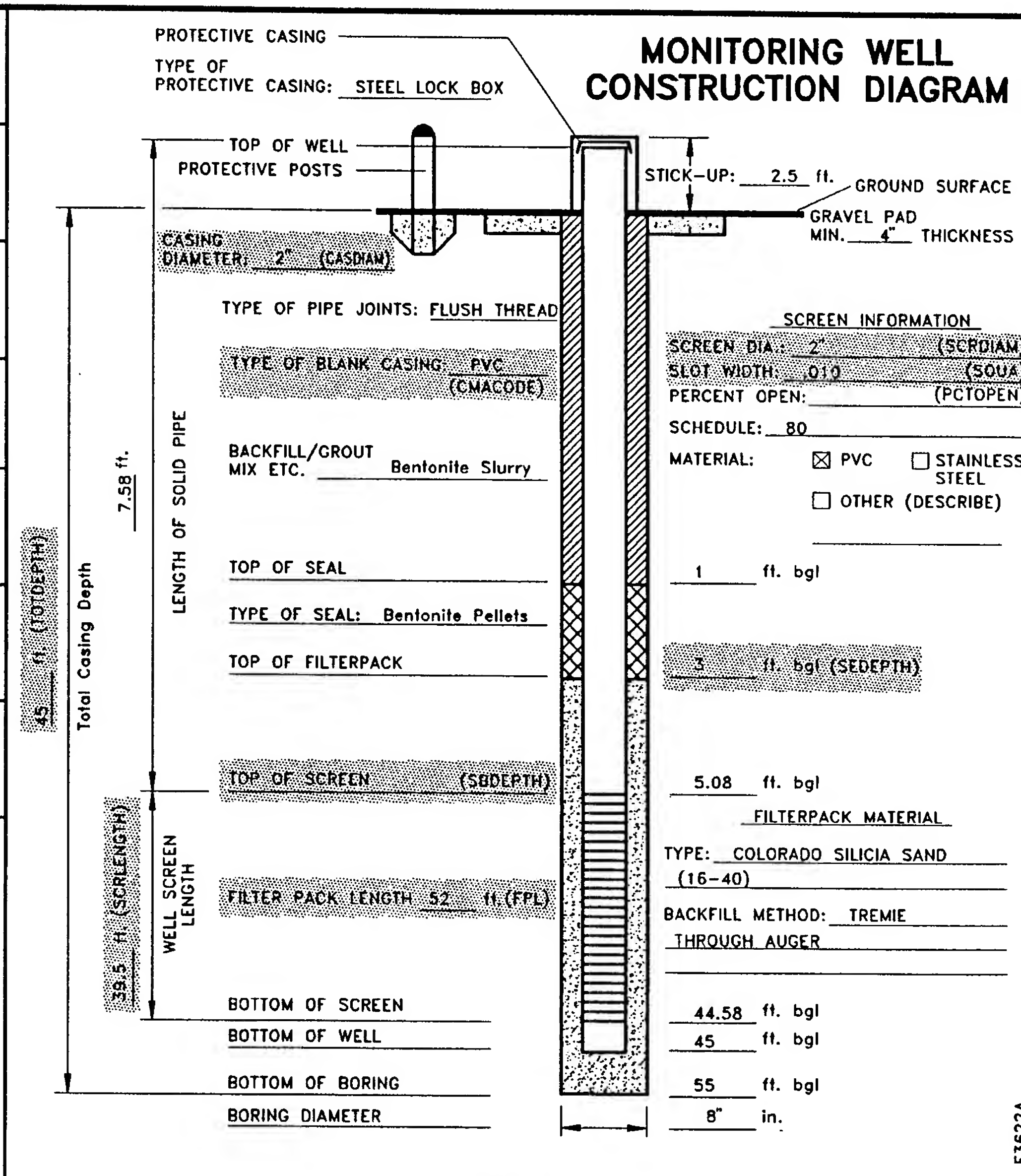
Remarks (REMARKS)

MONITORING WELL CONSTRUCTION DIAGRAM



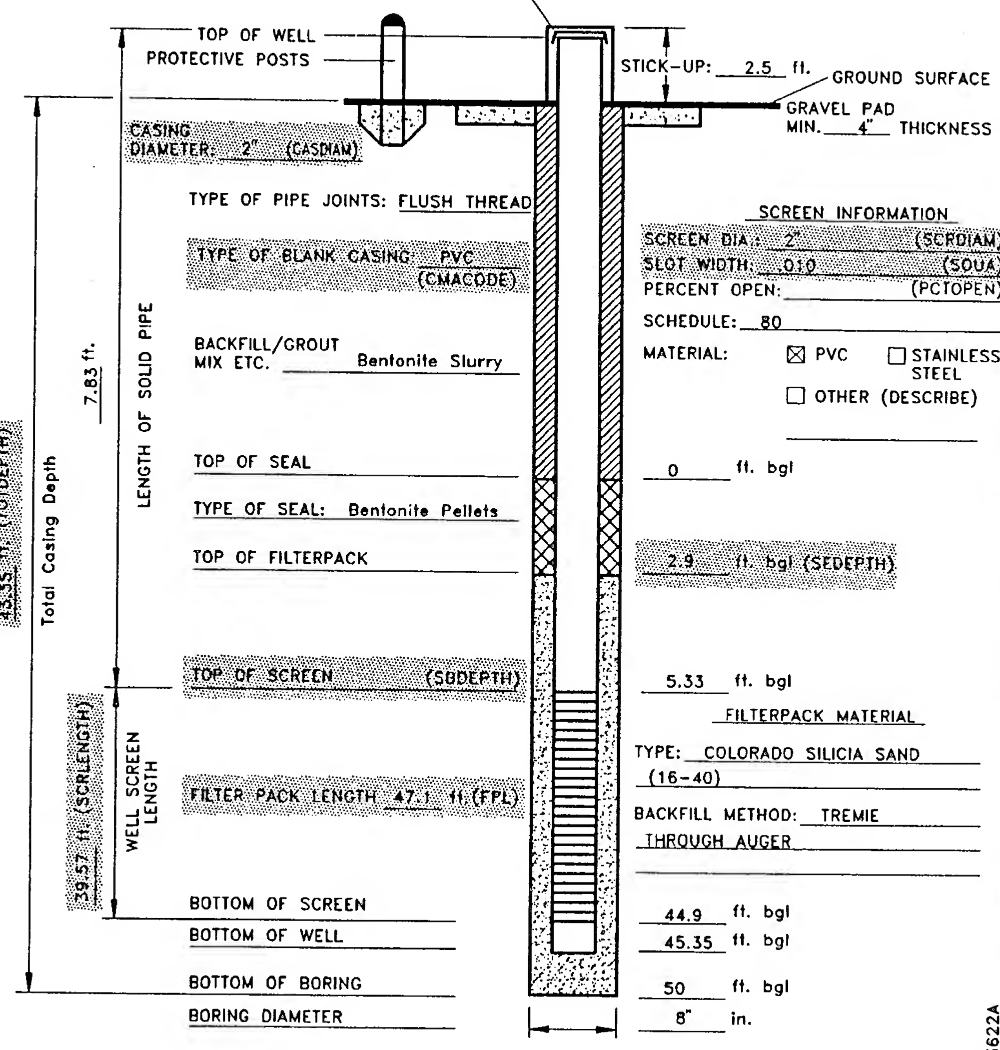
Project (PROJID) GALNA	Well I.D. (LOCID) 09-MW-06
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer PAC	Date Started (INSDATE) 08/17/92	Date Completed 08/17/92
Location Coordinates: (NCORD) (North) 3926845	(ECORD) (East) 1802849
Elevation Top of Casing (MPELV) 140.38	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



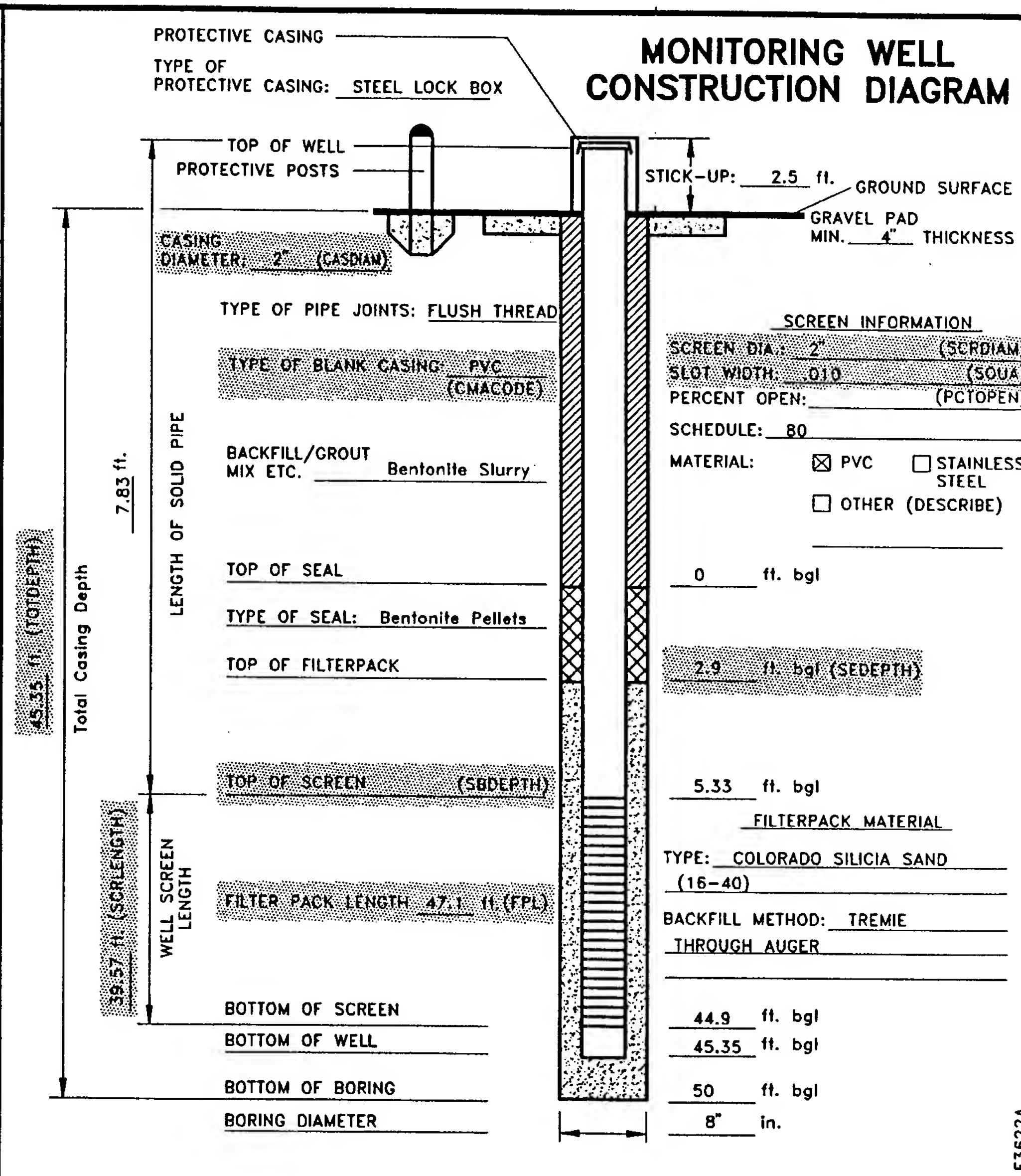
Project (PROJID) GALNA	Well I.D. (LOCID) 10-MW-01
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer GSC	Date Started (INSDATE) 07/13/92 / Date Completed 07/13/92
Location Coordinates: (NCORD) (North) 3926165	(ECORD) (East) 1803467
Elevation Top of Casing (MPELV) 144.3	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) –	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



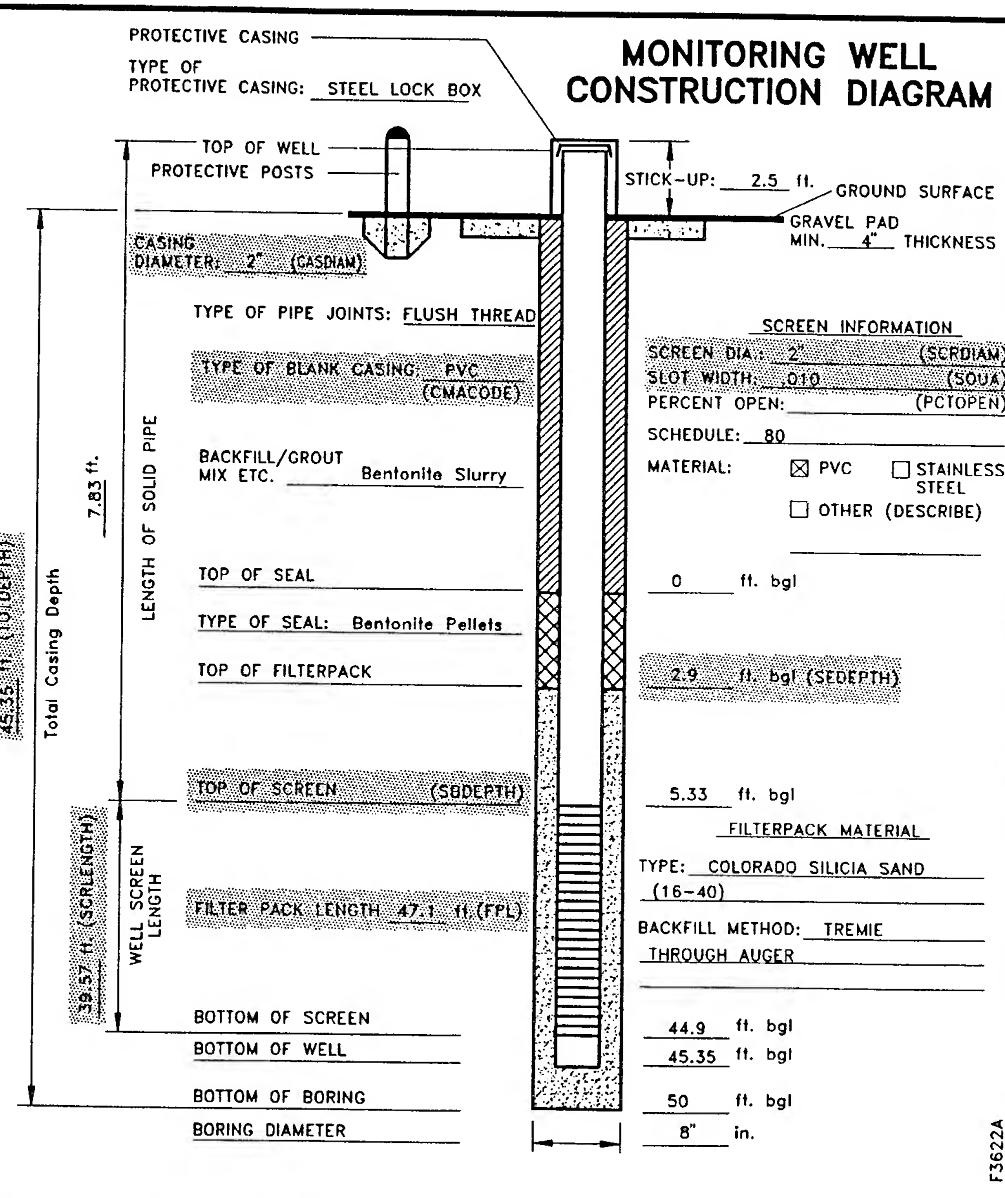
Project (PROJID): GALNA	Well I.D. (LOCID): 10-MW-02
Well Owner (VVL WELCODE): USAF	Well Type (WL WTCODE): MNW
Installer: GSC	Date Started (INSDATE): 07/12/92 — Date Completed: 07/12/92
Location Coordinates: (NCORD) (North) 3925989	(ECORD) (East) 1803621
Elevation Top of Casing (MPELV): 144.63	Completion Method (VVL WCMCODE): GS
Sole Source Aquifer Code (VVL SAQCODE): –	
Drilling Method: HS	Completion Zone (VVL GZCODE): W
Remarks (REMARKS):	

MONITORING WELL CONSTRUCTION DIAGRAM



Project (PROJID) GALNA	Well I.D. (LOCID) 10-MW-03
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installer GSC	Date Started (INSDATE) 07/11/92 — Date Completed 07/11/92
Location Coordinates: (NCORD) (North) 3925916	(ECORD) (East) 1803384
Elevation Top of Casing (MPELV) 145	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE) —	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Remarks (REMARKS)	

MONITORING WELL CONSTRUCTION DIAGRAM



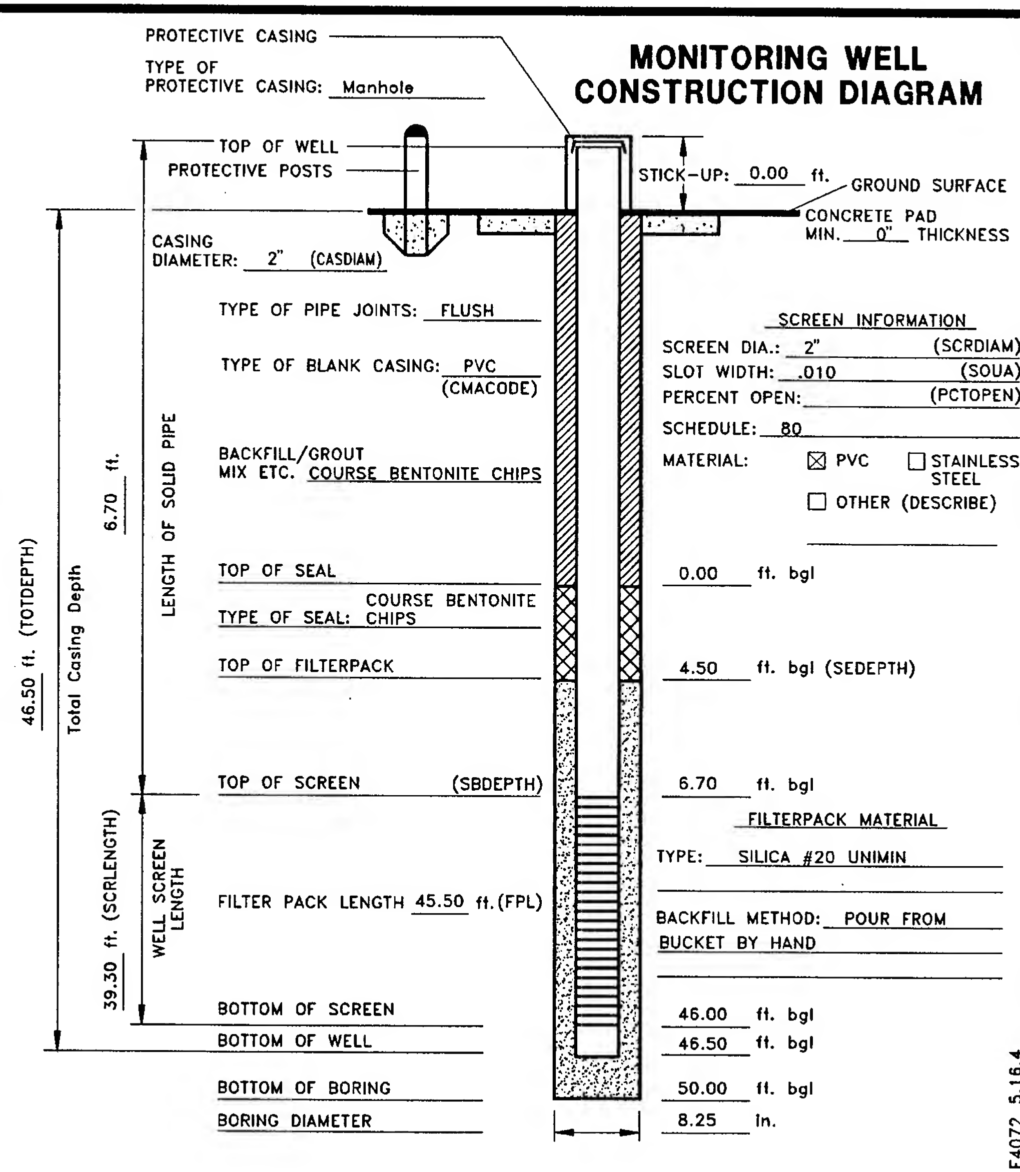
1993 Monitoring Well Construction Diagrams

MONITORING WELL CONSTRUCTION DIAGRAM

Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 01-MW-07
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installation Date (INDATE) 8/6/93	Date Started: 8/6/93 Date Completed: 8/6/93
Location Coordinates: (NCORD) (North) 3925231	(ECORD) (East) 1811069
Elevation Top of Casing (MPELV) --	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE)	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Installer/Inspector TAC	Date 8/6/93

Remarks (REMARKS)

Located at Soil Gas Point E3.
Downgradient of site.
Stickup cut off after survey due to State DOT request. Elevation not resurveyed.

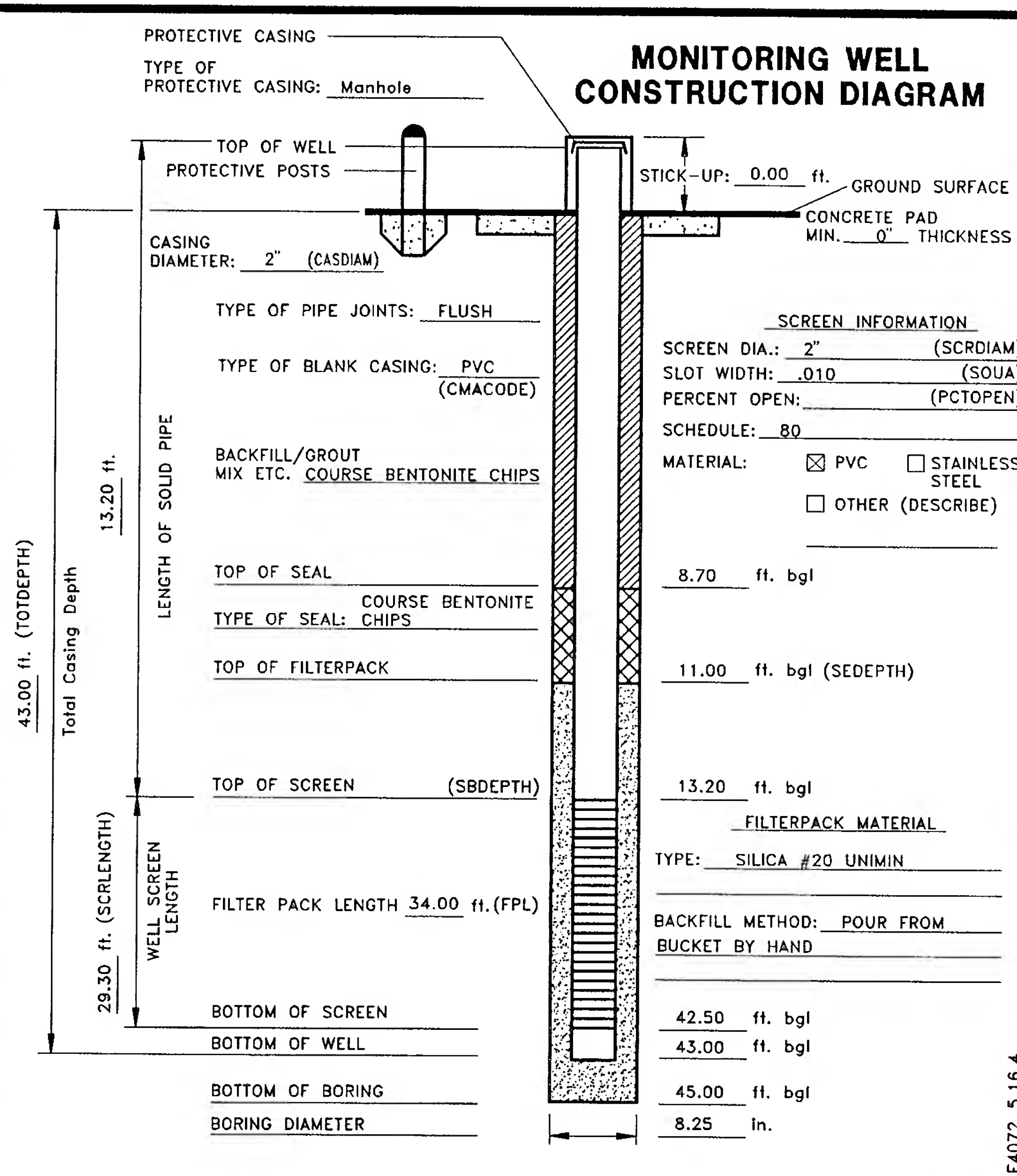


Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 01-MW-08
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installation Date (INDATE) 8/7/93	Date Started: 8/7/93 — Date Completed: 8/7/93
Location Coordinates: (NCORD) (North) 3925198	(ECORD) (East) 1811266
Elevation Top of Casing (MPELV) --	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE)	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Installer/Inspector TAC	Date 8/7/93

Remarks (REMARKS)

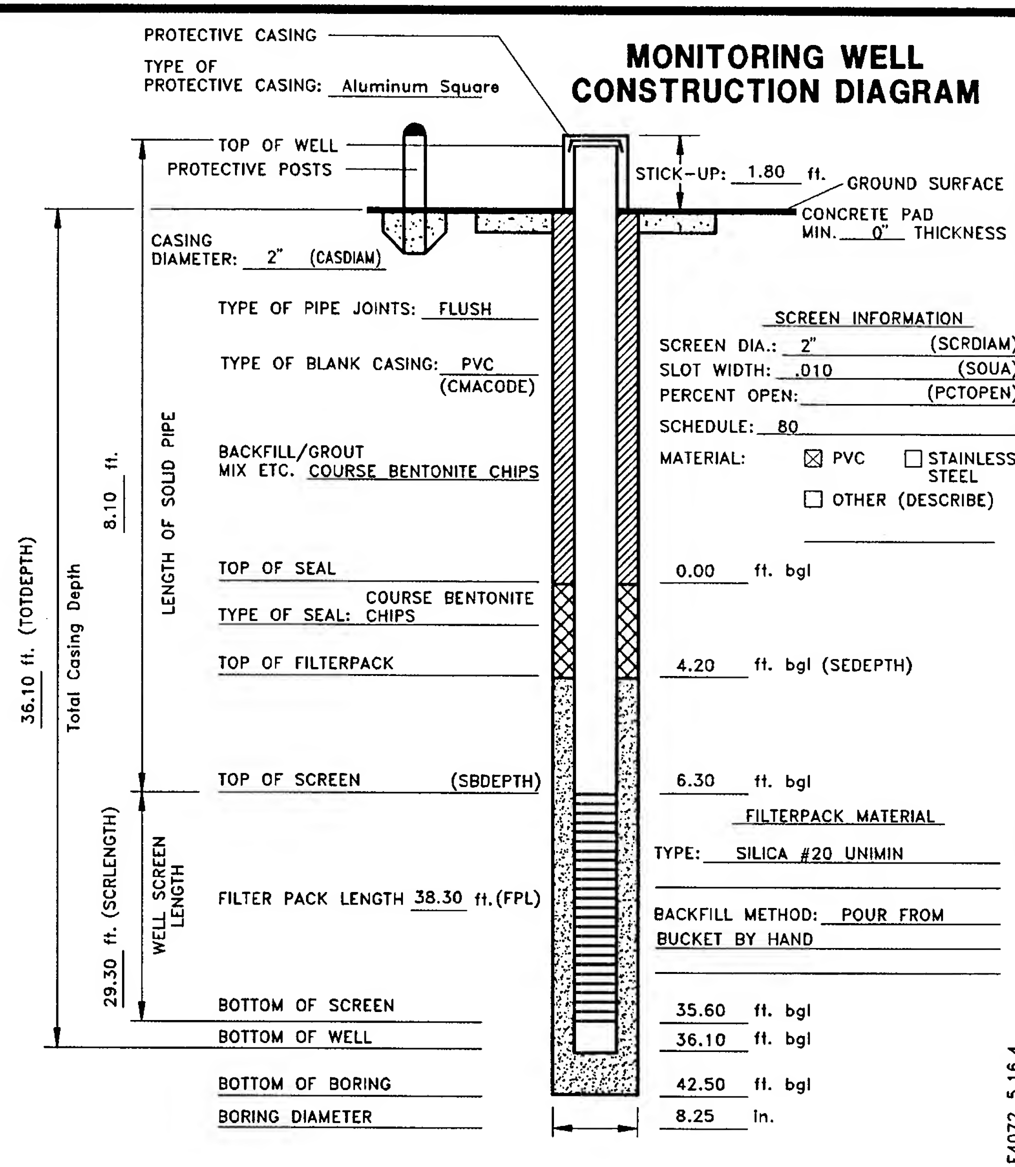
Located at Soil Gase Point E5 where FID measured 250 ppm in Soil Gas. Stick-up cut off after survey. Elevation of top of casing not reestablished.

MONITORING WELL CONSTRUCTION DIAGRAM



Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 05-MW-13
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installation Date (INDATE) 8/25/93	Date Started: 8/25/93 Date Completed: 8/25/93
Location Coordinates: (NCORD) (North) 3926307	(ECORD) (East) 1804190
Elevation Top of Casing (MPELV) 147.01	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE)	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Installer/Inspector RVP	Date 8/25/93
Remarks (REMARKS) East of installation fence, near POL Building.	

MONITORING WELL CONSTRUCTION DIAGRAM

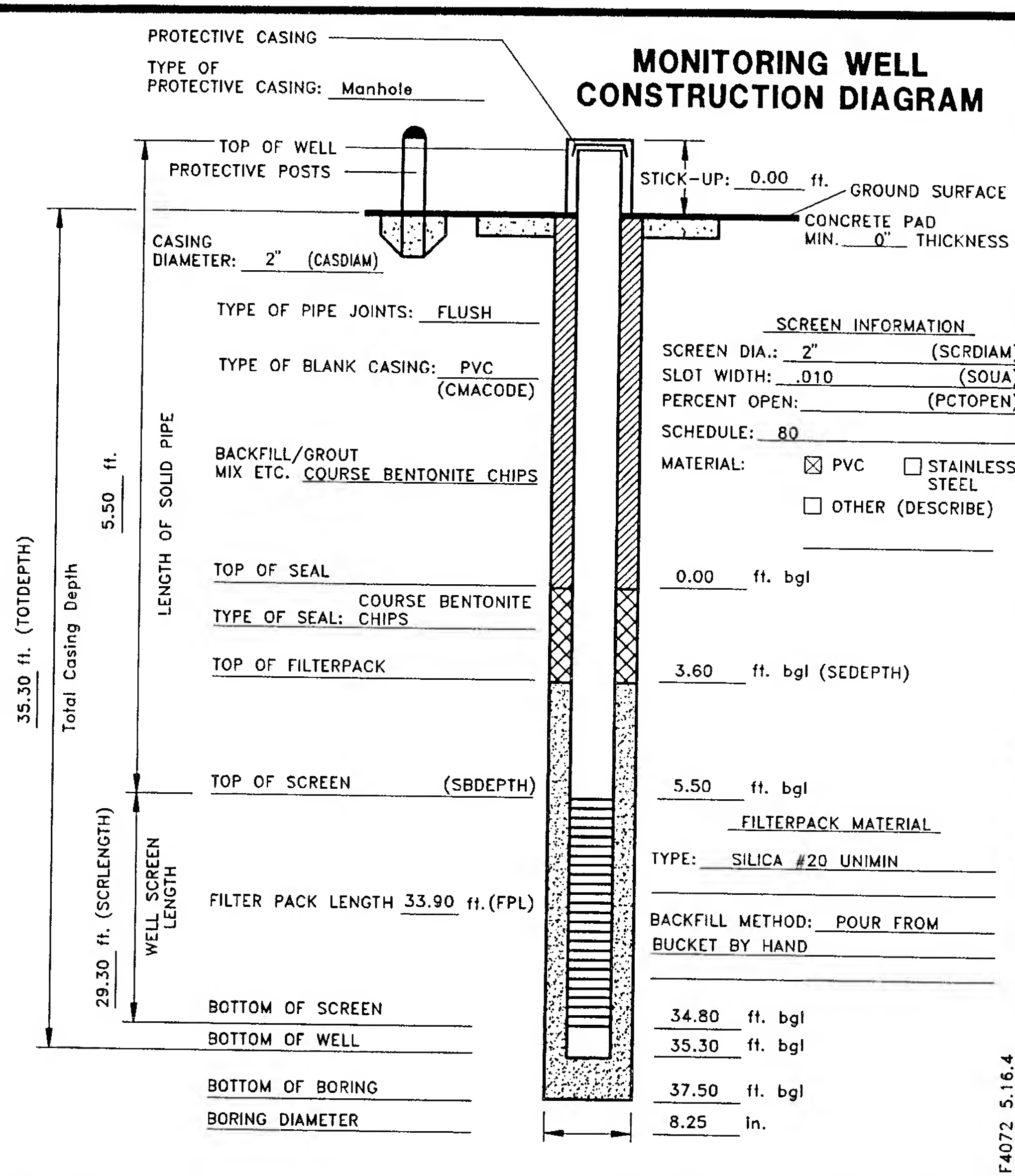


Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 05-MW-14
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installation Date (INDATE) 8/27/93	Date Started: 8/27/93 Date Completed: 8/27/93
Location Coordinates: (NCORD) (North) 3924798	(ECORD) (East) 1801950
Elevation Top of Casing (MPELV) 142.05	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE)	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Installer/Inspector RVP	Date 8/28/93

Remarks (REMARKS)

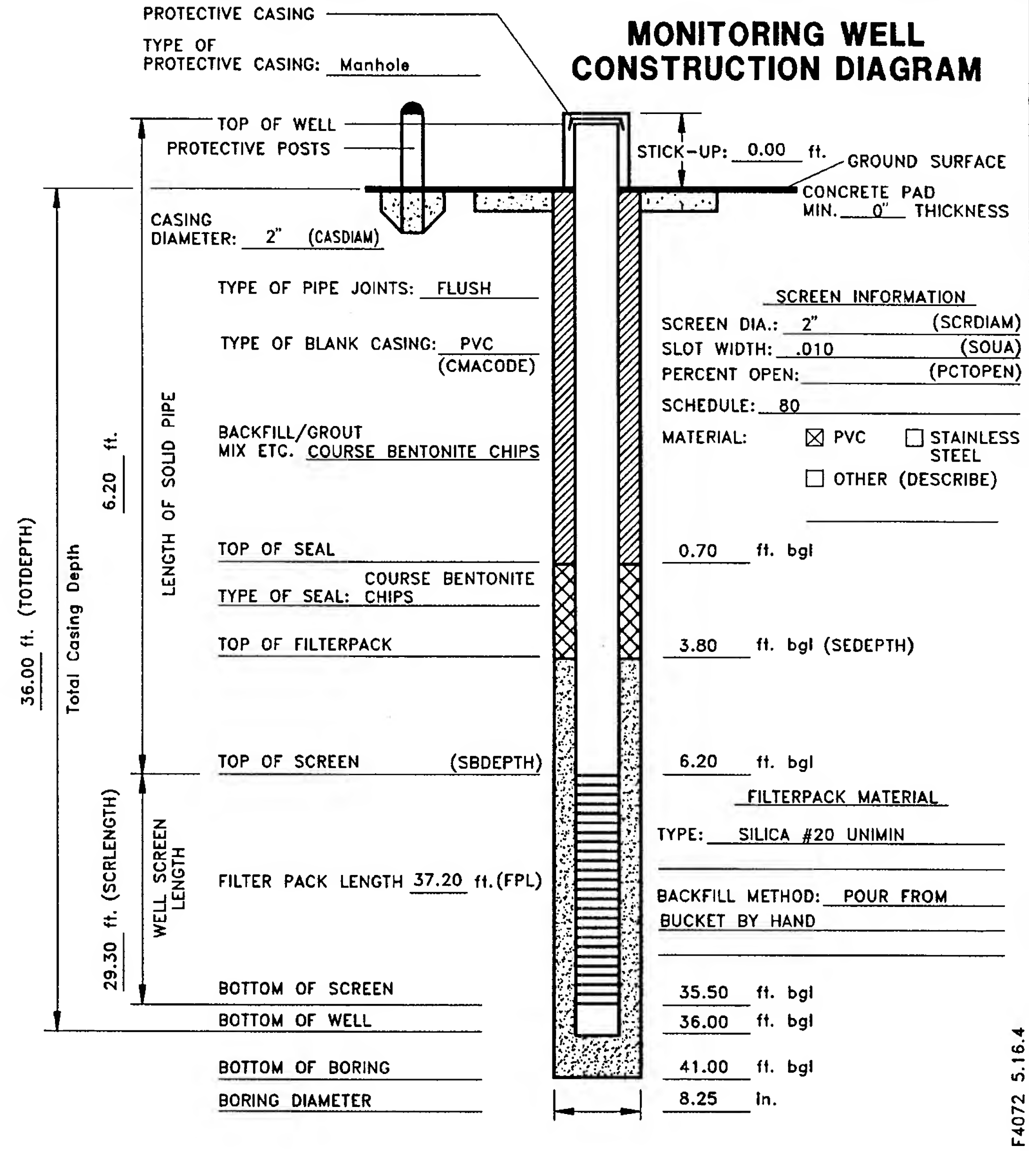
On tarmac near private plane parking area.

MONITORING WELL CONSTRUCTION DIAGRAM



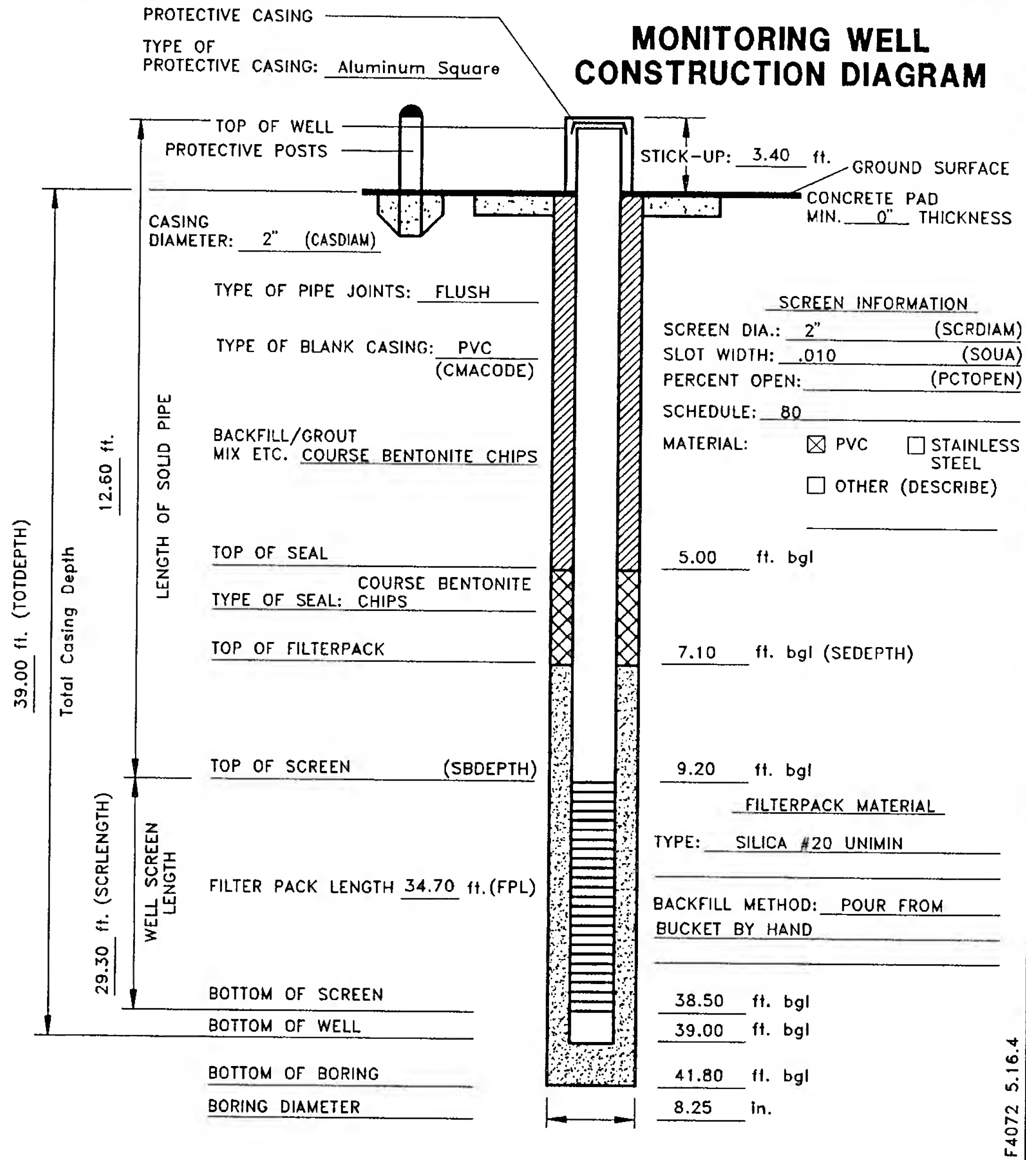
Air Force Base (VVL AFID)	GALNA	Well I.D. (LOCID)	05-MW-15
Well Owner (VVL WELCODE)	USAF	Well Type (WL WTCODE)	MNW
Installation Date (INDATE)	8/28/93	Date Started / Date Completed	8/28/93 / 8/28/93
Location Coordinates: (NCORD) (North)	3925725	(ECORD) (East)	1804487
Elevation Top of Casing (MPELV)	143.34	Completion Method (VVL WCMCODE)	GS
Sole Source Aquifer Code (VVL SAQCODE)			
Drilling Method	HS	Completion Zone (VVL GZCODE)	W
Installer/Inspector	RVP	Date	8/28/93
Remarks (REMARKS)	On tarmac near flight services		

MONITORING WELL CONSTRUCTION DIAGRAM



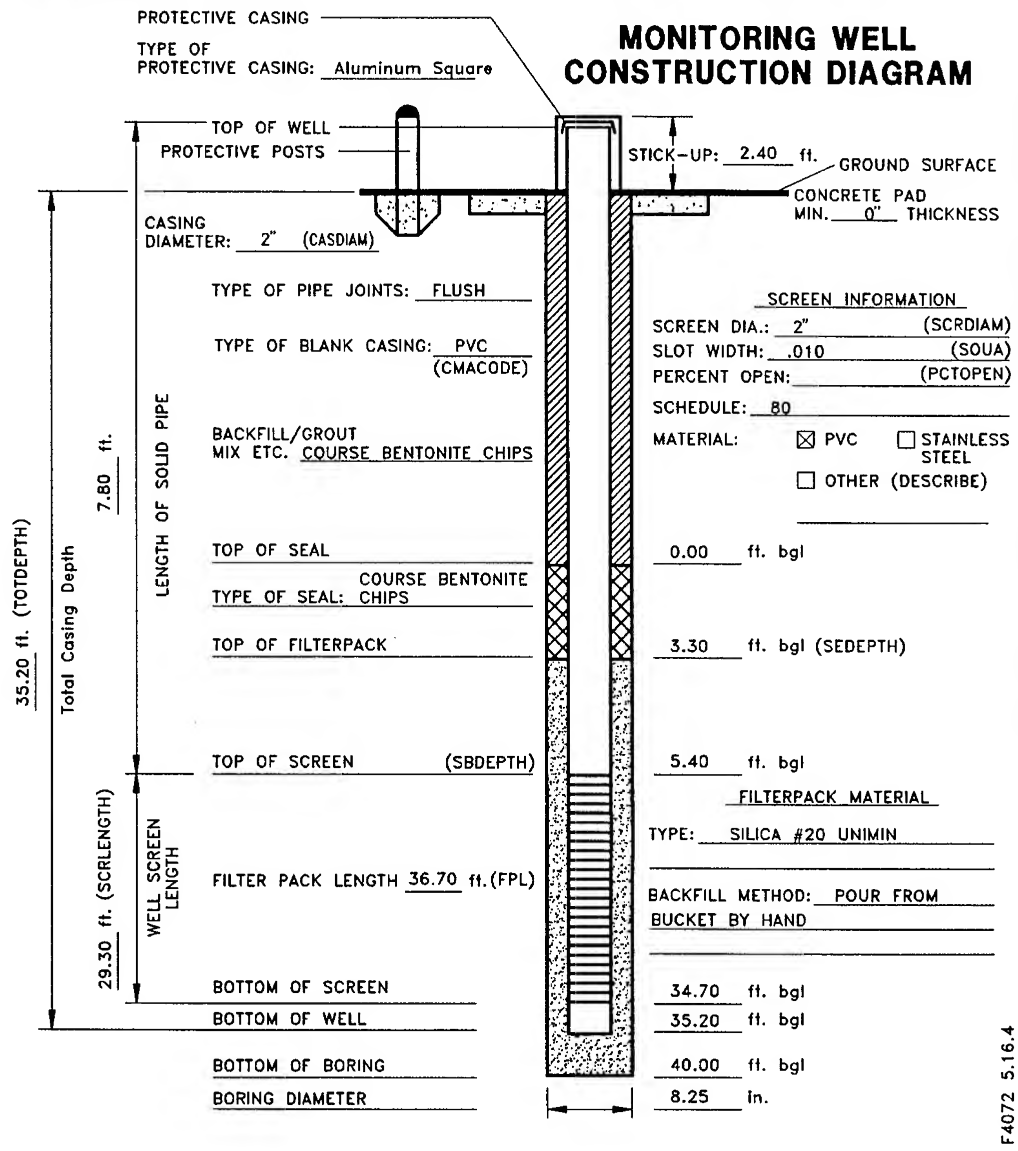
Air Force Base (VVL AFID)	Well I.D. (LOCID)	
GALNA	06-MW-07	
Well Owner (VVL WELCODE)	**Well Type (WL WTCODE)**	
USAF	MNW	
Installation Date (INDATE)	**Date Started**	**Date Completed**
8/26/93	8/26/93	8/26/93
Location Coordinates: (NCORD) (North) 3927008	(ECORD) (East) 1803826	
Elevation Top of Casing (MPELV)	**Completion Method (VVL WCMCODE)**	
143.34	GS	
Sole Source Aquifer Code (VVL SAQCODE)		
Drilling Method	**Completion Zone (VVL GZCODE)**	
HS	W	
Installer/Inspector	**Date**	
RVP	8/26/93	
Remarks (REMARKS)		
Across from old BLM housing		

MONITORING WELL CONSTRUCTION DIAGRAM



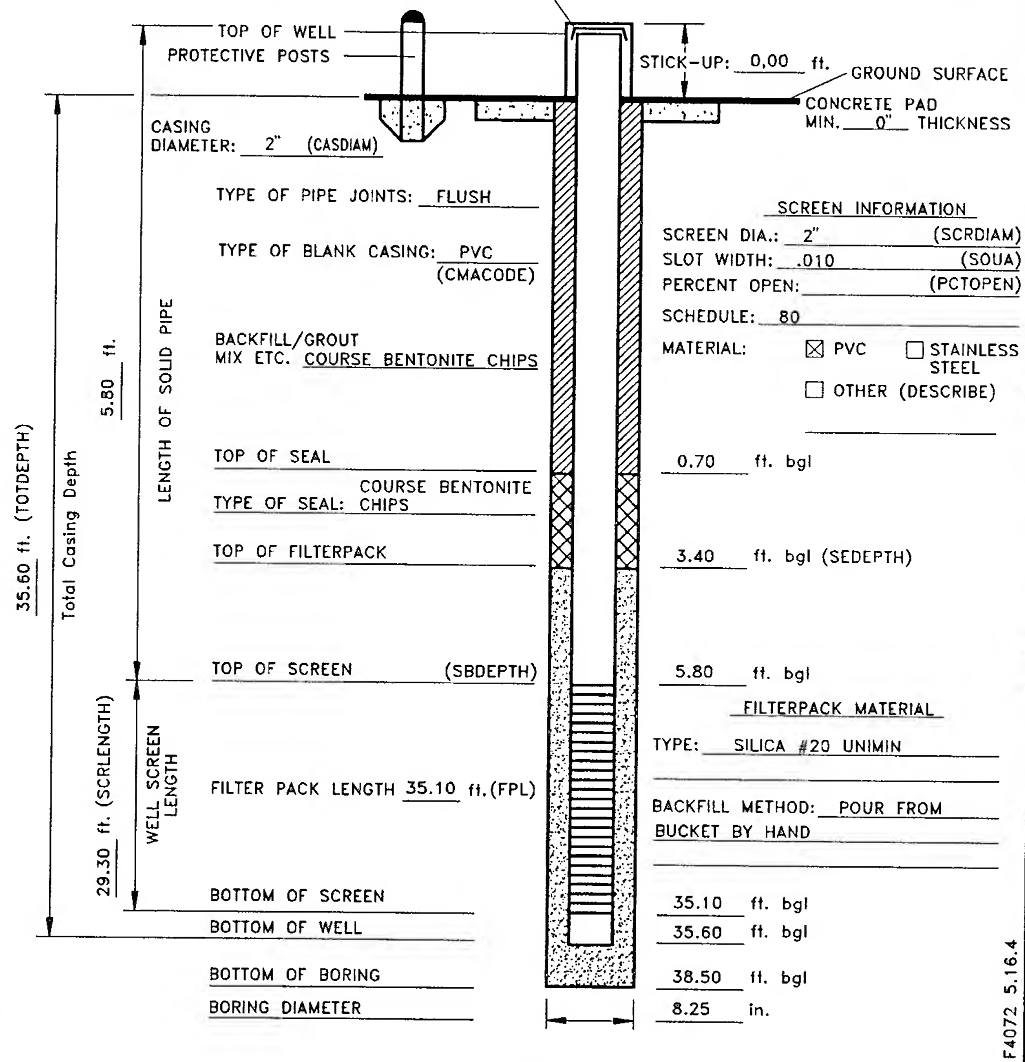
Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 09–MW–15
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW
Installation Date (INDATE) 8/24/93	Date Started: 8/24/93 Date Completed: 8/24/93
Location Coordinates: (NCORD) (North) 3925290	(ECORD) (East) 1802755
Elevation Top of Casing (MPELV) 142.62	Completion Method (VVL WCMCODE) GS
Sole Source Aquifer Code (VVL SAQCODE)	
Drilling Method HS	Completion Zone (VVL GZCODE) W
Installer/Inspector RVP	Date 8/24/93
Remarks (REMARKS) North of west end of runway	

MONITORING WELL CONSTRUCTION DIAGRAM



MONITORING WELL CONSTRUCTION DIAGRAM

Air Force Base (VVL AFID) GALNA	Well I.D. (LOCID) 10-MW-04	
Well Owner (VVL WELCODE) USAF	Well Type (WL WTCODE) MNW	
Installation Date (INDATE) 8/29/93	Date Started 8/29/93	Date Completed 8/29/93
Location Coordinates: (NCORD) (North) 3925546	(ECORD) (East) 1803251	
Elevation Top of Casing (MPELV) 143.05	Completion Method (VVL WCMCODE) GS	
Sole Source Aquifer Code (VVL SAQCODE)		
Drilling Method HS	Completion Zone (VVL GZCODE) W	
Installer/Inspector RVP	Date 8/29/93	
Remarks (REMARKS) Southeast corner of CAC hanger		



1992 Well Development Forms

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: Ø1-MW-Ø1
Date: 20-AUG-92
Time: 0910

Location: 01
Weather:
Supervisor: P. Caplan

Comments:

Field Measurements

HNU/OVA Reading (ppm): Ø.5 ppm
Water Depth (ft. btoc): 13.76
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 49.56
Saturated Thickness (ft.): 35.8
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
0900	—	—	—	—	—	13.76	Ø.5 ppm
0916	5	3.8	6.9	688			TURBID
0926	10	4.1	6.9	694			"
0933	15	2.6	6.9	668			"
0939	20	2.2	6.9	669			"
0949	25	3.2	6.9	691			"
0959	30	2.6	6.9	683			"
1009	35	2.6	6.6	667			Imoff 13ml/liter
1014	40	2.2	6.1	665			TURBID
1024	45	2.0	7.0	666			"
1029	50	2.3	6.9	672			"
1034	55	1.8	6.9	672			Mod Turbid
1045	60	2.3	7.0	436			" "
1050	65	2.1	6.8	634			Imoff = 15ml/liter
1057	70	1.9	6.9	627			MOD TURBID
1101	75	2.2	6.6	651			" "
1105	80	2.6	6.5	659			Less TURBID
1110	85	2.9	7.0	614			" "
1118	90	2.3	7.0	617			" "
1124	95	22	6.9	617		13.81	" "
1125	96	—	—	—	—	—	Imoff = 6ml/liter

Final Measurements: 22 | 6.9 | 617 | | 13.81

Total Volume Developed (gal.): 96
Final Well Depth (ft. btoc): 49.95
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: Ø1-MW-Ø2
Date: 8-19-92
Time: 1610

Location: (01)
Weather:
Supervisor: P. Coplan

Comments:

Field Measurements

HNU/OVA Reading (ppm): 35.0
Water Depth (ft. btoc): ~~13.7~~ 12.36
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 29.53
Saturated Thickness (ft.): 17.17
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turb	Water Level	Comments
1604	—	—	—	—		12.36	35.0 ppm
1623	2	6.6	6.1	781			Very TURBID
1626	6	3.6	6.1	752			" "
1630	9	5.6	6.1	844			" "
1634	12	2.7	6.2	760			" "
1637	15	3.1	6.2	770			" "
1638	16	—	—	—	—	—	Imoff 48 ml/liter
1640	18	2.7	6.3	755			TURBID
1641	21	2.6	6.3	756			"
1644	24	3.2	6.4	751			"
1646	27	2.5	6.5	760			"
1652	30	4.8	6.5	777			"
1653	31	—	—	—	—	—	Imoff 13 ml/liter
1655	33	2.6	6.5	709			TURBID
1657	36	3.8	6.5	748			"
1659	39	4.9	6.5	787			"
1702	42	2.8	6.5	739			"
1705	45	2.5	6.5	740			"
1707	48	3.3	6.6	761		12.59	"
1708	—	—	—	—	—	—	Imoff 11 ml/liter

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	3.3	6.6	761		12.59

Total Volume Developed (gal.): 48 gal
Final Well Depth (ft. btoc): 29.83
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: 04-MW-02
Date: 19-AUG-92
Time: 0920

Location: Ambient Site (04)
Weather:
Supervisor: R Copeland

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 10.90
Product Thickness (ft.): Ø
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 18.06
Saturated Thickness (ft.): 7.16
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
0920	Ø	—	—	—		10.90	OVM=0.0
0956	5	3.5	6.7	666			TURBID
0959	7	—	—	—			Imhoff = 15 ml/liter
1011	10	4.0	6.7	683			TURBID
1015	10	—	—	—			No Water - Allowed well to recharge
1039	14	—	—	—			Imhoff 15 ml/liter
1040	15	2.0	6.5	646			Mod TURBID
1041	15	—	—	—			No Water - Allowed to recharge
1113	20	3.9	6.2	664			Mod TURBID
1114	21	—	—	—		14.94	Imhoff = 1 ml/liter

Final Measurements: | 21 | 3.9 | 6.2 | 664 | 14.94 |

Total Volume Developed (gal.): 21
Final Well Depth (ft. btoc): 14.94
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: 04-MW-03
Date: 8-19-92
Time: 1403

Location: Airport Site (04)
Weather:
Supervisor: R. Chapman

Comments: Temp. of pond of standing water 77' NORTH of Well = 18°C

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 9.79
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 22.94
Saturated Thickness (ft.): 13.15
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1403	0	—	—	—		9.79	0.0 PPM
1427	3	14.6	7.0	888			+ Very Turbid
1430	6	14.1	6.9	872			" "
1432	9	14.2	6.9	875			" "
1433	12	14.3	6.9	876			Turb = 34 ml/liter
1434	15	14.2	7.0	867			Very Turbid
1435	18	14.3	7.0	857			" "
1436	21	14.6	7.0	868			" "
1439	24	13.8	7.0	828			Turb = 43 ml/liter
1440	27	13.2	7.0	832			Turbid
1442	30	13.8	7.0	841			"
1443	33	14.3	7.0	862			"
1445	36	13.8	7.0	827		9.85	Turb = 24 ml/liter

Final Measurements:

36	13.8	7.0	827	9.85

Total Volume Developed (gal.): 36 gal
Final Well Depth (ft. btoc): 22.93
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: OS MW 01
Date: 8/29/92
Time: 1120

Location: 05
Weather: Cool and rainy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 20.23
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 53.90
Saturated Thickness (ft.): 33.67
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1107	-	-	-	-		20.23	1.0 ppm
1123	5	3.8	8.7	609			turbid
1129	10	3.0	8.5	604			"
1132	15	3.0	8.3	672			"
1143	20	3.5	8.1	680			"
1148	25	2.9	7.3	679			"
1153	30	3.1	6.7	679			" Imoff .25ml
1157	35	2.5	6.4	671			"
1201	40	2.4	6.2	678			"
1206	45	2.6	6.6	684			"
1212	50	2.7	6.9	672			"
1221	55	3.3	9.1*	641			"
1230	60	3.5	9.0	640			" Imoff 1.0ml
1235	65	2.7	8.8	633			"
1239	70	2.6	8.4	661			"
1245	75	2.8	6.0	658			"
1250	80	2.4	5.2	663			Clearing
1254	85	2.6	4.7	659			"
1258	90	2.6	4.8	659		20.29	" Imoff .05ml
							"
							"
							"
* PH meter questionable							"

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	2.6	4.8	659		20.29

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 53.88
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: Galena AFS
Client:

Well ID: OS MW 02
Date: 28 Aug 92
Time: 1510

Location: OS
Weather: cool + cloudy, clearing in afternoon
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm): 249
Water Depth (ft. btoc): 19.21
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 53.47
Saturated Thickness (ft.): 34.26
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1500	—	-	-	-		19.21	0.0 ppm OVM
1523	5	3.5	7.0	473			turbid
1529	10	3.1	6.0	488			"
1533	15	2.4	4.2	493			"
1539	20	2.5	4.7	491			"
1547	25	2.4	5.9	490			"
1551	30	2.4	6.3	493			Imoff - 4ml
1601	35	3.0	6.6	467			clearing
1605	40	3.2	6.7	476			turbid
1610	45	2.3	5.2	482			"
1616	50	2.4	6.9	474			clearing
1619	55	2.5	5.3	492			"
1625	60	3.2	6.3	498			"
1628	65	2.4	4.5	485			Imoff: 2ml
1630	70	2.1	5.1	485			clearing
1635	75	2.2	5.2	482			lightly turbid
1640	80	2.5	5.1	486			" "
1646	85	2.4	5.9	480			" "
1650	90	2.3	5.4	483			Imoff - 1.75mL

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	2.3	5.4	483		

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 53.42
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena AFS
Client:

Well ID: 05 MW 03
Date: 30 Aug 92
Time: 1515

Location: 05
Weather: Cool and Rainy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 17.74
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 53.74
Saturated Thickness (ft.): 36.00
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1454	-	-	-	-		17.74	360 ppm
1518	5	5.4	7.4	672			turbid
1522	10	3.8	7.1	651			"
1533	15	3.8	7.1	663			"
1540	20	3.8	7.0	670			"
1549	25	3.6	6.4	667			"
1554	30	3.6	6.2	666			" Imoff 3ml/liter
1602	35	3.4	5.4	683			Clearing
1606	40	3.3	5.1	662			"
1610	45	3.7	5.4	670			"
1615	50	3.2	6.3	668			"
1621	55	3.4	6.5	667			"
1627	60	3.1	6.9	662			" Imoff 3.5ml/liter
1630	65	3.1	65	664			"
1634	70	3.3	6.5	668			"
1639	75	3.0	6.7	664			"
1642	80	2.7	5.8	668			"
1645	85	3.0	5.6	665			"
1649	90	3.1	6.0	668		17.77	" Imoff 2ml/liter

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	3.1	6.0	668		17.77

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 53.74
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 05 mw04
Date: 29 Aug 92
Time: 0850

Location: 05
Weather: cool and rainy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 15.48
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 49.34
Saturated Thickness (ft.): 33.86
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
0836	-	-	-	-		15.48	216.0ppm -0.0 B2
0853	5	3.1	7.9	833			turbid
0859	10	2.5	6.1	810			"
0906	15	2.4	7.1	800			"
0914	20	2.6	7.1	795			"
0922	25	2.3	7.5	777			"
0928	30	2.2	6.9	789			Imoff 21ml
0934	35	2.4	7.1	783			Turbid
0942	40	1.8	7.7	771			"
0949	45	1.9	7.3	778			"
0954	50	1.9	7.7	784			"
0958	55	1.8	7.7	782			"
1005	60	1.8	7.9	784			Imoff 7ml
1012	65	2.2	8.8	759			turbid
1016	70	1.9	8.7	760			"
1020	75	2.2	8.6	782			"
1025	80	2.1	8.6	780			"
1029	85	2.0	8.6	783			"
1039	90	2.3	8.5	796		15.48	Imoff 3ml

Final Measurements:	2.3	8.5	796		15.48

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 49.20
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: Galena AFS
Client:

Well ID: 05 MW 05
Date: 28 Aug 92
Time: 1730

Location: 05
Weather: Clear and cloudy, clearing in after-noon
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 16.82
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 49.74
Saturated Thickness (ft.): 32.92
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1717	-	-	-	-		16.82	123.0 ppm
1733	5	3.9	6.7	868			very turbid
1735	10	2.6	6.7	866			" "
1740	15	2.8	5.7	877			" "
1745	20	2.5	4.8	876			" "
1747	25	2.7	5.1	889			" "
1753	30	2.8	5.7	869			Imoff - 7.5ml
1757	35	2.7	5.4	863			very turbid
1802	40	2.7	5.6	865			" "
1806	45	2.4	5.5	859			" "
1809	50	2.0	5.2	861			" "
1820	55	5.1	7.2	867			" "
1825	60	3.0	7.2	816			Imoff 8ml
1830	65	2.6	7.1	808			turbid
1835	70	3.2	6.7	838			"
1840	75	2.5	6.6	850			"
1845	80	2.6	6.3	850			Light
1849	85	2.8	6.0	857			"
1854	90	2.5	6.4	837			Imoff 3.5mL

Final Measurements: | 2.5 | 6.4 | 837 | | |

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 49.68
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: OS MW 010
Date: 28 Aug 92
Time: 2140

Location: 05
Weather: Cool and Cloudy, clearing afternoo
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 13.21
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 41.81
Saturated Thickness (ft.): 28.60
5 well volumes (gal.):

Development Method: waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
2131	-	-	-	-		13.21	0.0 ppm
2143	5	5.5	7.0	728			turbid
2146	10	4.5	6.2	728			"
2148	15	4.4	5.9	732			"
2153	20	4.2	4.7	758			"
2156	25	4.1	3.7	748			Clearing
2200	30	4.1	2.8 *	747			Imoff - 1ml
2208	35	4.3	3.2	748			Clearing
2211	40	4.0	3.1	743			"
2216	45	4.3	4.2	744			"
2226	50	4.6	4.9	736			"
2234	55	4.5	5.3	737			"
2240	60	4.1	4.8	747			Imoff - 0.5ml
2245	65	4.1	4.5	739			clearing
2250	70	4.3	4.1	742			"
2254	75	4.1	4.3	738			"
2300	80	4.1	4.5	735			"
2304	85	3.9	5.2	741			"
2307	90	4.9	6.2	439		11.24	Imoff - 2ml

* operation of PH probe very questionable

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	4.9	6.2	439		11.24

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 48.67
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: 06-MW-03
Date: 18 AUG 92
Time: 10:05

Location: Waste Accumulation AREA (06)
Weather:
Supervisor: P Copeland

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 13.42
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 48.71
Saturated Thickness (ft.): 35.29
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	~~pH~~ Cond	~~Cond~~ pH	Turb	Water Level	Comments
1041	0	—	—	—	—	13.43	No OVM Reading
1045	5	5.4	728	6.7			TURBID
1048	10	4.8	681	6.7			"
1050	15	4.7	679	6.6			"
1051	20	4.7	678	6.4			"
1054	25	4.8	678	6.6			"
1057	30	4.7	676	6.3			"
1100	35	4.8	679	6.3			Imhoff = 20ml per liter
1102	40	4.9	677	6.3			TURBID
1112	45	4.8	675	6.4			"
1121	50	4.8	671	6.5			"
1123	55	4.7	670	6.3			"
1123							LUNCH
1318							RETURN
1323	60	5.1	656	6.6			Imhoff Cone - 7ml per liter
1327	65	4.9	676	6.4			Turbid
1334	70	4.9	683	6.4			"
1337	75	4.8	684	6.2			"
1339	80	4.8	682	6.2			"
1343	85	5.2	656	6.6			"
1345	90	4.9	657	6.5			"
1347	95	4.9	671	6.5			Ltly Tur.
1351	110	5.3	672	6.6		13.32	Imhoff - 2.5ml per liter

Final Measurements:				
110 gal	5.3	6.6 ph	672 µmh	

Total Volume Developed (gal.): 110 ft
Final Well Depth (ft. btoc): 48.70
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 07 MW 01
Date: 21 AUG 92
Time: 1714

Location: 07
Weather:
Supervisor: P. Coplen

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 3.93
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 15.24
Saturated Thickness (ft.): 11.31
5 well volumes (gal.):

Development Method: Watera Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1714	3	5.7	7.3	611		3.93	very turbid well is dn
1729	6	3.3	7.2	571			" " "
1740	9	3.5	7.0	603			" " "
1758	12	2.4	7.2	601			" Imoff 60ml/liter
1809	15	4.1	7.2	600			" " "
1817	18	3.6	7.2	606			" " "
1820	21	4.2	7.2	592			Imoff 18ml/liter
1843	24	3.3	7.2	583			" " "
1847	26	4.0	7.2	590			" " "
	30	3.8	7.2	587			Imoff 12ml/liter
					end DTW Rising		1/10' per 4.11 sec.

Final Measurements: 3.8 | 7.2 | 587 | |

Total Volume Developed (gal.): 30
Final Well Depth (ft. btoc): 16.78
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: GALENA AFS
Client:

Well ID: Ø7-MW-Ø2
Date: Ø 20 AUG 92
Time: 1542

Location: Campion (07)
Weather:
Supervisor: P Coplan

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 2.9
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 22.74
Saturated Thickness (ft.): 19.84
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turb	Water Level	Comments
1520	—	—	—	—	—	—	0.0 ppm
1542	5	3.4	7.7	755		2.9	Very TURBID
1547	15	1.8	7.7	731			" "
1550	17	1.8	7.6	753			" "
1555	20	2.1	7.7	754			Imhoff = 25 ml/liter
1559	23	1.5	7.7	757			Very Turbid
1601	25	1.7	7.7	755			" "
1605	30	1.6	7.7	749			" "
1607	35	1.5	7.6	742			" "
1610	40	1.5	7.4	757			Imhoff = 6 ml/liter
1618	43	1.9	7.0	754			LESS TURBID
1622	45	1.9	6.9	756			" "
1626	50	1.6	6.9	749			" "
1631	55	1.4	6.9	748		2.1	Imhoff = 5 ml/liter

Final Measurements: 1.4 | 6.9 | 748 | | 2.1

Total Volume Developed (gal.): 55
Final Well Depth (ft. btoc): 22.62
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 07 MW 03
Date: 22 AUG 92
Time: 0955

Location: 07
Weather:
Supervisor: P. Coplen

Comments:

Field Measurements

HNU/OVA Reading (ppm): 245
Water Depth (ft. btoc): 3.14
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 17.06
Saturated Thickness (ft.): 13.92
5 well volumes (gal.):

Development Method: waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
0950	0	—	—	—		3.14	40 ppm ovm
0958	1	4.7	7.3	812			very turbid
1006	5	2.4	7.3	713			" "
1009	9	1.8	5.0	707			" "
1015	12	1.8	4.8	716			" Imoff 13ml/liter
1019	15	1.6	4.2	698			" "
1021	18	1.4	4.6	694			" "
1023	21	1.7	4.7	700			Turbid
1027	24	1.6	5.3	707			" Imoff 4ml/liter
1029	27	2.0	4.7	703			"
1033	30	1.1	5.4	702			"
1036	33	1.2	4.7	697			"
1039	36	1.2	4.3	707			" Imoff 4ml/liter
1041	38	2.0	4.8	715		3.66	"
1041	end purge						

	Temp.	pH	Cond	Turb	Water Level
Final Measurements:	2.0	4.8	715		3.66

Total Volume Developed (gal.): 38
Final Well Depth (ft. btoc): 17.12
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 07 mw 04
Date: 20AUG92 - 21AUG92
Time: 1725

Location: 07
Weather:
Supervisor: P. Coplen

Comments:

Field Measurements

HNU/OVA Reading (ppm): 249
Water Depth (ft. btoc): 21.35
Product Thickness (ft.):
Well Volume (gal.): 5.4

Product Depth (ft. btoc):
Well Depth (ft. btoc): 55.08
Saturated Thickness (ft.): 33.73
5 well volumes (gal.): 27.00

Development Method: waterra Inertial pump

	Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
8-20	1725	–	–	–	–		21.35	0.2 ppm
	1750	5	3.8	7.9	656			very turbid
	1754	10	2.6	13.4	625			" "
	1757	15	2.1	11.7	621			Imhoff" 64.5 ml/liter
	1806	20	3.1	13.2	666			" "
	1823	25	2.3	15.8	645			" "
	1830	30	3.2	6.9	668			Imoff
	1837	35	3.9	7.2	688			" "
	1841	40	2.9	7.2	665			" "
	1843	45	3.7	7.1	679			" "
	1853	50	3.6	7.2	649			" "
	1901	55	3.0	7.1	655			Imoff 29ml/liter Stop fo
8-21	1421	60	6.2	7.0	736			mod turbid
	1428	65	5.4	7.2	717			" "
	1528	70	2.7	7.2	669			" "
	1545	75	3.5	7.2	699			" "
	1601	80	3.7	7.2	705			" "
	1611	85	3.6	7.2	697			turbid
	1619	90	3.3	7.2	685			" Imoff 8ml/liter

Final Measurements: 3.3 | 7.2 | 685 | |

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc):
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 09 mw 01
Date: 8/22/92
Time: 1055

Location: 09
Weather:
Supervisor: P. Coplen

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 12.03
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 47.64
Saturated Thickness (ft.): 35.61
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turb	Water Level	Comments
1045	-	-	-	-		12.03	0.0 ppm
1702	5	7.0	6.6	696			turbid
1705	10	5.8	6.6	694			"
1709	15	5.4	6.6	709			"
1711	20	5.2	6.6	728			"
1715	25	5.2	6.9	735			"
1717	30	5.6	6.7	734			" Imoff 3.5ml/liter
1722	35	5.2	7.0	732			"
1726	40	5.4	7.0	739			"
1731	45	5.8	7.0	703			"
1733	50	5.6	7.0	701			"
1739	55	5.7	7.0	704			"
1743	60	5.5	7.0	710			" Imoff 4.5ml/liter
1749	65	5.8	7.1	673			"
1753	70	5.5	7.1	675			Clearing
1756	75	5.4	7.0	703			"
1802	80	5.6	7.1	682			"
1809	85	5.4	7.0	654			Clearing
1810	90	5.4	7.0	666			"
1814	95	5.6	7.0	693		12.16	" Imoff 1.5ml/liter
1814	end purge						

	Temp.	pH	Cond	Turb	Water Level
Final Measurements:	5.6	7.0	693		12.16

Total Volume Developed (gal.): 95
Final Well Depth (ft. btoc): 47.66
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 09 MW 03
Date: 24 AUG 92
Time: 1325

Location: 09
Weather: warm and sunny
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 13.32
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 47.53
Saturated Thickness (ft.): 34.21
5 well volumes (gal.):

Development Method: waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1200	-	-	-	-		13.32	0.0 ppm
1330	5	5.8	7.9	583			turbid
1334	10	4.5	8.0	500			"
1344	15	4.1	8.2	577			"
1448	20	3.6	8.4	561			"
1355	25	5.6	8.6	576			"
1403	30	6.2	8.7	595			" Imoff 6ml/liter
1411	35	5.3	8.7	549			"
1424	40	5.3	8.8	549			"
1434	45	5.9	8.8	562			"
1442	50	5.0	8.9	548			"
1451	55	4.4	8.9	555			"
1455	60	4.0	8.8	558			" Imoff 4ml/liter
1505	65	5.2	8.8	581			"
1509	70	4.3	8.7	567			"
1513	75	4.1	7.3	563			"
1521	80	4.1	8.2	554			"
1523	85	4.2	7.7	566			"
1529	90	3.6	7.8	552		13.37	Lightly turbid Imoff .6ml/l

	Temp.	pH	Cond	Turb	Water Level
Final Measurements:	3.6	7.8	552		13.37

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 47.24
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena AFS
Client:

Well ID: 09 MW 04
Date: 8/23/92
Time: 1416

Location: 09
Weather:
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 15.12
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 47.53
Saturated Thickness (ft.): 32.41
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1416	-	-	-	-		15.12	
1430	5	10.1	6.8	485			0.0ppm
1447	10	7.2	6.9	688			Turbid
1456	15	5.7	6.9	687			"
1502	20	5.2	7.6	707			"
1510	25	4.9	8.2	722			"
1518	30	4.6	8.3	711			"
1523	35	4.6	8.4	705			" Imoff 25ml/liter
1529	40	4.5	8.6	698			"
1535	45	5.4	7.9	710			"
1542	50	4.8	8.8	661			"
1546	55	4.8	8.6	689			"
1554	60	5.5	8.7	677			"
1600	65	4.8	8.7	675			" Imoff 6ml/liter
1605	70	4.1	8.0	699			"
1607	75	3.8	8.0	698			"
1610	80	4.0	8.2	697			"
1616	85	4.3	8.1	692			Lightly turBid
1618	90	4.2	8.1	686		15.16	" Imoff 2.25ml/liter

	Temp.	pH	Cond	Turb	Water Level
Final Measurements:	4.2	8.1	686		15.16

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 47.44
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 09 mw 05
Date: 27 Aug 92
Time: 1550

Location: 09
Weather: cold and cloudy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm): 249
Water Depth (ft. btoc): 11.07
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 47.46
Saturated Thickness (ft.): 36.39
5 well volumes (gal.):

Development Method: waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1520	-	-	-	-		11.07	0.0 ppm ovm
1600	5	4.1	6.4	575			turbid
1604	10	3.3	5.7	601			"
1610	15	3.3	6.4	599			"
1619	25	3.3	7.2	572			"
1622	30	3.0	6.4	592			Imoff 1.5ml
1627	35	3.1	7.0	591			turbid
1633	40	3.2	7.5	575			clearing
1639	45	3.2	7.3	585			"
1645	50	3.2	7.5	582			clean
1653	55	3.3	7.6	543			"
1707	60	3.5	7.4	551			"
1709	65	3.1	7.1	556			Imoff 1.25ml
1715	70	2.9	6.8	574			clean
1721	75	2.8	6.8	569			"
1726	80	3.0	7.1	573			"
1732	85	3.0	7.2	573			"
1737	90	2.8	7.2	566			"
1740	95	2.7	7.0	570			"
1743	100	2.7	7.0	570		11.08	Imoff 1.0ml

Final Measurements: 2.7 | 7.0 | 570 | | 11.08

Total Volume Developed (gal.): 100
Final Well Depth (ft. btoc): 47.08
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 09 MW 06
Date: 27 Aug 92
Time: 1150

Location: 09
Weather: Cold and cloudy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 9.97
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 47.10
Saturated Thickness (ft.): 37.13
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1130	-	-	-	-		9.97	0.0 ppm
1158	5	5.8	6.6	475			turbid
1203	10	3.6	6.5	411			"
1207	15	3.2	6.5	398			"
1213	20	3.0	6.4	390			"
1218	25	2.9	6.3	383			"
1225	30	3.2	6.2	387			"
1229	35	3.2	6.2	376			"Imoff 15ml/liter
1235	40	3.0	6.3	369			Less turbid
1247	45	3.2	6.2	350			" "
1250	50	3.0	6.1	355			" "
1253	55	2.9	6.0	364			" "
1301	60	3.4	6.5	348			" "
1305	65	3.1	6.4	362			" "
1311	70	3.0	6.5	362			Clearing Imoff 1.5ml/
1316	75	2.9	6.6	359			"
1324	80	3.0	6.8	335			"
1329	85	~~2.9~~	~~6.8~~	340			Clean
1333	90	3.0	6.8	356			"
1336	95	2.8	6.8	344			"
1341	100	3.1	7.0	345			"
1345	105	2.8	7.1	347			"
1348	110	2.8	7.1	348		9.97	"Imoff .35ml/liter

end purge

	Temp.	pH	Cond	Turb	Water Level
Final Measurements:	2.8	7.1	348		

Total Volume Developed (gal.): 110
Final Well Depth (ft. btoc): 47.10
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 10 MW 01
Date: 22 Aug 92
Time: 1415

Location: 10
Weather:
Supervisor: P. Coplen

Comments:

Field Measurements

HNU/OVA Reading (ppm): 245
Water Depth (ft. btoc): 13.34
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 46.80
Saturated Thickness (ft.): 33.46
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1406	-	-	-	-		13.34	0.0 ppm
1427	5	6.3	7.1	695			turbid
1431	10	5.6	6.6	670			"
1436	15	5.6	6.4	681			"
1438	20	5.5	6.1	694			"
1445	25	6.1	6.6	697			"
1448	30	5.1	6.7	693			" Imoff 2.5ml
1453	35	4.8	3.3	687			Lightly turbid
1457	40	5.0	3.2	688			" "
1504	45	7.2	6.8	777			" "
1508	50	5.4	6.6	690			" "
1520	55	7.2	6.6	742			" "
1524	60	6.0	6.6	720			" Imoff 2.0ml
1532	65	5.7	6.7	714			" "
1537	70	5.1	6.8	701			" "
1542	75	5.8	6.8	719			" "
1548	80	5.4	6.9	704			very lgt. turbidity
1554	85	5.5	6.9	708			" " "
1602	90	5.5	6.9	673		14.39	" Imoff .5mL
1602	end purge						

Final Measurements:	Temp.	pH	Cond	Turb	Water Level
	5.5	6.9	673		14.39

Total Volume Developed (gal.): 90
Final Well Depth (ft. btoc): 46.76
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: Galena AES
Client: -

Well ID: 10-MW-02
Date: 18-AUG-95
Time: 1520

Location: 10
Weather:
Supervisor: E. Copeland

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0 ppm
Water Depth (ft. btoc): 13.31
Product Thickness (ft.): —
Well Volume (gal.): —

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.65
Saturated Thickness (ft.): 34.34
5 well volumes (gal.):

Development Method: Waterra Inertial Pump

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turb	Water Level	Comments
1520	0	—	—	—		13.31	Very Turbid
1544	5	5.3	6.8	792		|	" "
1547	10	5.1	6.9	786		|	" "
1550	15	5.1	6.8	780		|	" "
1551	20	5.1	6.4	816			" "
1600	25	5.2	6.6	793			" "
1602	30	4.7	5.8	824			Imhoff = 18 ml / liter
1603	35	4.9	4.4	816			Very Turbid
1609	40	4.7	3.7	817			" "
1611	45	4.6	3.8	816			" "
1613	50	4.8	4.1	820			" "
1621	55	4.5	4.1	816			" "
1628	60	4.6	6.6	798			" "
1630	65	4.5	6.6	772			" "
1631	70	4.3	6.6	771			Imhoff = 13 ml / liter
1633	75	4.4	6.3	802			Very Turbid
1636	80	4.3	4.5	800			Turbid
1641	85	4.3	4.8	807			"
1644	90	4.3	3.8	795			"
1648	95	4.7	4.9	802			"
1650	100	5.4	4.7	819			Lt to Mod Turbid
1652	~~110~~ 105	5.6	4.6	828			" " "
1654	110	5.9	5.5	831		13.32	Imhoff - 6 ml / liter

Final Measurements: 110 | 5.9 | 5.5 | 831 | 13.32

* Water has apparent hydrocarbon sheen.

Total Volume Developed (gal.): 110 gal
Final Well Depth (ft. btoc): ~~13~~ 47.67
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: galena afs
Client:

Well ID: 12 MW01
Date: 8/30/92
Time: 0840

Location: 12
Weather: Cool and Rainy
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 13.14
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 29.79
Saturated Thickness (ft.): 16.65
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
0820	-	-	-	-		13.14	0.0 ppm
0848	5	4.6	6.9	539			very turbid
0857	10	4.3	6.6	523			" "
0908	15	4.2	6.1	519			Imoff 11ml/liter
0910	18	3.7	5.0	515			very turbid
0915	21	3.8	5.2	505			Clearing
0923	24	4.2	5.8	510			"
0925	27	4.2	5.5	505			"
0933	30	4.7	6.7	494			" Imoff 4ml/liter
0937	33	4.5	6.8	472			"
0945	36	4.0	6.8	468			"
0949	39	4.1	6.6	488			"
0959	42	4.1	6.7	481			"
1002	45	4.2	6.3	497		13.16	" Imoff 1ml/liter

Final Measurements:

Temp.	pH	Cond	Turb	Water Level
4.2	6.3	497		13.16

Total Volume Developed (gal.): 45
Final Well Depth (ft. btoc): 28.94
Photograph Number:

MONITORING WELL DEVELOPMENT LOG

RADIAN CORPORATION

Project: Galena afs
Client:

Well ID: 12 MW 02
Date: 30 Aug 92
Time: 1100

Location: 12
Weather: cool and Rainy.
Supervisor: B. Coel

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 11.11
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 26.52
Saturated Thickness (ft.): 15.41
5 well volumes (gal.):

Development Method: Waterra Inertial pump

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turb	Water Level	Comments
1100	-	-	-	-			
1114	3	5.4	7.3	572		11.11	0.0 ppm
1117	6	6.2	7.3	578			turbid
1120	9	5.2	6.8	579			"
1125	12	4.8	5.8	585			"
1127	15	5.0	4.6	583			" Imoff 17ml/liter
1129	18	4.8	4.4	577			"
1133	21	4.9	4.5	571			"
1139	24	4.7	4.2	558			"
1143	27	4.4	4.3	549			"
1146	30	4.6	4.5	550			"
1148	33	4.4	4.1	547			" Imoff 6.5ml/liter
1150	36	4.4	4.4	542			"
1152	39	4.3	4.8	540		11.14	" Imoff 2.25ml/liter

Final Measurements: | 4.3 | 4.8 | 540 | | 11.14 |

Total Volume Developed (gal.): 39
Final Well Depth (ft. btoc): 26.12
Photograph Number:

1993 Well Development Forms

DEVELOPMENT
GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01 MW07
Date: 9-9-93
Time: 1310

Location: FTA
Weather: COLD RAINY
Samplers: BAT, DRT

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 22.94
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 50.13
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: WATERRA PUMP

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1329	—	—	—	—	—	
1335	5	1°C	6.63	1100	DK BROWN SILT	
1344	10.0	1°C	6.72	1070	"	
1351	15.0	1°C	6.72	1050	"	
1357	20.0	1°C	6.69	1060	"	
1409	25.0	1°C	6.71	1050	"	
1414	30.0	1°C	6.70	1040	"	
1421	35.0	1°C	6.72	1050	"	
1429	40.0	1°C	6.72	1040	"	
1435	45.0	1°C	6.73	1060	"	
1440	50.0	1°C	6.73	1060	"	WENT TO GET PALLET
1506	55.0	1°C	6.71	1090	"	
1510	60.0	1°C	6.72	1070	"	
1518	65.0	1°C	6.74	1090	"	
1523	70.0	1°C	6.68	1080	"	
1532	75.0	1°C	6.72	1090	"	
1536	80.0	1°C	6.72	1080	"	
1544	85.0	1°C	6.71	1090	"	
1550	90.0	1°C	6.71	1080		
1558	95.0	1°C	6.70	1100		
1611	100.0	1°C	6.71	1080		WENT TO GET DRUMS & PALLET
1655	105.0	1°C	6.67	1080		
1701	110	1°C	6.70	1080		
						Final Measurements

Devel.

GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

CONTINUATION

0

Well ID: 01MW07
Date:
Time:

Location:
Weather:
Samplers:

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1710	115.0	1°C	6.68	1100	DK Brown Silt/Sand	
1717	120.0	1°C	6.65	1080	"	
1725	125.0	1°C	6.70	1180 0GAT	"	
1730	130.0	1°C	6.67	1080	"	
1739	135.0	1°C	6.72	1110	"	
1745	140.0	1°C	6.68	1100	Lt. Brown Silt/Sand	
9.9 1754	145.0	1°C	6.71	1100	"	
1758	150.0	1°C	6.68	1100	"	
1807	155.0	1°C	6.71	1100	"	- Heavy Sand
1813	160.0	1°C	6.67	1100	"	
1821	165.0	1°C	6.70	1100	"	
> 1827	170.0	1°C	6.66	1100	"	
1839	175.0	1°C	6.72	1100	"	New D Run
1845	180.0	1°C	6.69	1100	"	Imhoff Cone -
1853	185.0	1°C	6.71	1100	"	
1858	190.0	1°C	6.67	1100	"	
1907	195.0	1°C	6.70	1100	"	
1911	200.0	1°C	6.66	1100	"	Stopped - E.O.D.
7-10 1104	205.0	1°C	6.64	1070		
1111	210.0	1°C	6.65	1070		
1117	220.0	1°C	6.64	1070		
1126	225.0	1°C	6.68	1080		
1131	230.0	1°C	6.67	1070		
						Final Measurements

~~GROUNDWATER SAMPLING LOG~~ GROUNDWATER LEVEL LOG

CONTINUATION - p. 3

Project: Galena AFS RI
Client: AFCEE

Well ID: 01 MW07
Date: 9-10-93
Time:

Location:
Weather:
Samplers:

Comments: QUIT PER TODD COUNCIL

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1138	235.0	1°C	6.68	1090		
1143	240.0	1°C	6.67	1070		
1150	245.0	1°C	6.69	1100		
1321	—	—	—	—		22.84' Well Depth.
						Final Measurements

Development

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01MW08
Date: 9-10-93
Time: 1324

Location: FTA
Weather: 50's, PARTLY CLOUDY
Samplers: GAT/DRT

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): ~~23~~.35
Product Thickness (ft.): 22
Well Volume (gal.):
Purge Method: WATERRA PUMP

Product Depth (ft. btoc):
Well Depth (ft. btoc): 45.23
Saturated Thickness (ft.):
3 well volumes (gal.):
Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1340	—	—	—	—	—	Start
1345	5.0	1.0°C	6.73	1290	DARK BROWN · SILT/SAND	
1352	10.0	1°C	6.85	1280		
1400	15.0	1°C	6.87	1290		
1407	20.0	1°C	6.85	1280		
1414	25.0	1°C	6.87	1280		
1419	30.0	1°C	6.87	1280		
1425	35.0	1°C	6.88	1290		
1432	40.0	1°C	6.90	1280		
1440	45.0	1°C	6.85	1280		
1446	50.0	1°C	6.87	1280		
1454	55.0	1°C	6.90	1280		
1459	60.0	1°C	6.86	1280		
1506	65.0	1°C	6.85	1280		
1511	70.0	1°C	6.87	1280		
1521	75.0	1°C	6.89	1280		New Drum
1526	80.0	1°C	6.87	1280		
1534	85.0	1°C	6.86	1280		
1539	90.0	1°C	6.88	1280		
1547	95.0	1°C	6.93	1280		Very Sandy!
1551	100.0	1°C	6.88	1270		
1558	105.0	1°C	6.89	1280		Imhoff Cone
1606	110.0	1°C	6.91	1270		
						Final Measurements

GROUNDWATER ~~SAMPLING~~ Development LOG

CONTINUATION

Project: Galena AFS RI
Client: AFCEE

Well ID: 01MW08
Date:
Time:

Location:
Weather:
Samplers:

Comments:

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1615	115.0	1°C	6.89	1270	Almost Clear	
1619	120.0	1°C	6.88	1270	"	
1624	121.0	—	—	—	"	Imhoff Cone -
W/L						22.32
						Final Measurements

GROUNDWATER ~~SAMPLING~~ Development LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-13
Date: 9.6.93 / 9.7.93
Time: 1815

Location: SE OF GALENA AFB ENTRANCE - NEXT TO FENCE
Weather: RAINY
Samplers: GAT/DRT

Comments:

FINAL IMHOFF CONE < 0.5 ml

Field Measurements

HNU/OVA Reading (ppm): 0.0 / 0.0
Water Depth (ft. btoc): 18.69 ft / 18.81 ft.
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 37.76 ft.
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: WATERRA

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1832	—	—	—	—	—	
1839	5.0	1.0°C	6.49	1160	DK. BROWN	
1845	10.0	1°C	6.51	1130	"	
1853	15.0	1°C	6.58	1150	"	
1900	20.0	1°C	6.50	1140	"	
1908	25.0	1°C	6.57	1150	"	
1914	30.0	1°C	6.59	1140	"	
1922	35.0	1°C	6.57	1140	"	
1927	—	—	—	—	—	ENDED DEVEL. FOR E.O.D.
9-8 0830	40.0	1°C	6.48	1130	DK BROWN	
0842	45.0	1°C	6.52	1120	"	
0848	50.0	1°C	6.50	1130	"	DRUM FILLED/GO GET NEW DRUM
0908	55.0	1°C	6.51	1120	"	WATER CLEARING
0916	60.0	1°C	6.53	1120	"	
0923	65.0	1°C	6.56	1120	Semi-Clear	
0932	70.0	1°C	6.51	1130	"	
0943	75.0	1°C	6.56	1130	"	
0949	80.0	1°C	6.52	1130	"	
0959	85.0	1°C	6.54	1110		
1006	90.0	1°C	6.54	1120		
1015	95.0	1°C	6.55	1120		
1344	←	—	—	—	←	18.64' - Water Depth
						Final Measurements

~~GROUNDWATER SAMPLING LOG~~ DEVELOPMENT

Project: Galena AFS RI
Client: AFCEE

Well ID: 05MW14
Date: 9-9-93
Time: 0830

Location: RUNWAY
Weather: COLD, RAINY
Samplers: GAT / DRT

Comments: NO PVC CAP ON WELL

IMHOFF CONE =0.25ml

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 13.18
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 35.28
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turbidity	Comments
0853	—	—	—	—	—	Start
0858	5.0	1.0C	~	900	DK. BROWN SILT./SAND	
0907	10.0	1°C	6.60	880	"	" / "
0916	15.0	1°C	6.60	900	"	" / "
0920	20.0	1°C	6.56	890	"	" / "
0927	25.0	1°C	6.57	890	"	" / "
0933	30.0	1°C	6.57	890	"	" / "
0941	35.0	1°C	6.58	890	"	" / "
0945	40.0	1°C	6.58	900	"	" / "
0951	45.0	1°C	6.61	890	LT. BRN SILT / SAND	
0956	50.0	1°C	6.57	900	"	" / "
1003	55.0	1°C	6.62	890	"	" / " NEW DRUM
1008	60.0	1°C	6.59	880	"	" / "
1016	65.0	1°C	6.63	890	"	" / "
1020	70.0	1°C	6.59	890	"	" / "
1027	75.0	1°C	6.64	900	"	" / "
1033	80.0	1°C	6.61	890	Almost Clear - Sand	
1040	85.0	1°C	6.65	900	"	"
1045	90.0	1°C	6.61	890	"	"
1052	95.0	1°C	6.69	900	"	"
1100	100	1°C	6.68	890		IMHOFF CONE
1111						W/L 13.15
						Final Measurements

Development
GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: ~~09MW05~~ 05MW15
Date: 9-8-92
Time: 1352

Location: RUNWAY
Weather: COLD, CLOUDY
Samplers: GAJ, DRT

Comments:

IMHOFF CONE < .5 ml

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 14.82
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 35.32
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: WATERRA PUMP

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1412	—	—	—	—	—	Start.
1421	5.0	1°C	6.81	960	DK. BROWN SILT	
1429	10.0	1°C	6.76	930	"	
1436	15.0	1°C	6.76	940	"	
1441	20.0	1°C	6.76	930	"	
1448	25.0	1°C	6.81	930	"	
1454	30.0	1°C	6.74	910	"	
1503	35.0	1°C	6.78	920	"	
1509	40.0	1°C	6.79	900	"	
1519	45.0	1°C	6.82	910	LT. BROWN SILT	
1524	50.0	1°C	6.75	900		WENT TO GET DRUM #
1601	55.0	1°C	6.75	900		
1610	60.0	1°C	6.76	910		
1615	65.0	1°C	6.75	900		CLEARING SOMEWHAT
1625	70.0	1°C	6.80	900		
1630	75.0	1°C	6.72	900		
1640	80.0	1°C	6.78	890		
1646	85.0	1°C	6.76	890		
1655	90.0	1°C	6.79	890		
1700	95.0	1°C	6.74	890		
1710	100.0	1°C	6.78	880		New Drum #
1734	105.0	1°C	6.70	870		
1741	110.0	1°C	6.76	880		
						Final Measurements

OVER

05-MW-15 (Cont'd)

Time	Vol	Temp	pH	Cond.	Turb.	Comments
1749	115.0	1°C	6.77	880	Almost Clear	Some Sand
– 1757	120.0	1°C	6.78	870	"	Imhoff Cone
1803	125.0	1°C	6.73	880	"	"
1809	130.0	1°C	6.74	880	"	
– 1818	135.0	1°C	6.79	880	"	Imhoff Cone
1841	–	–	–	–	W/L 14.73	

DEVELOPMENT
GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-07
Date: 9-6-93
Time:

Location: FXM (S. SIDE NEXT TO FENCE)
Weather: RAINY
Samplers: GAT / DRT

Comments:

FINAL IMHOFF CONE < 0.5 ML

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 23.51 ft.
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 43.74 ft.
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

	Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
9-6	1600	—	—	—	—	—	
	1625	5.0	4°C	6.68	1370	DK BRN	
	1652	10.0	3°C	6.66	1360	MED BRN	
	1705	11.0	—	—	—	—	PUMPED DRY - MOVED TO NEXT WELL
9-7	1351	—	—	—	—	—	W/L 23.60
	1413	16.0	2°C	6.53	1460		LT BRN
	1420	21.0	2°C	6.49	1440		"
	1426	26.0	2°C	6.58	1460		"
	1435	31.0	2°C	6.62	1460		"
	1440	36.0	2°C	6.52	1460		"
	1449	41.0	2°C	6.60	1450		"
	1455	46.0	2°C	6.52	1450		
	1505	51.0	2°C	6.57	1460		
	1510	56.0	2°C	6.61	1460		
	1519	61.0	2°C	6.58	1460		
	1527	66.0	2°C	6.59	1470		
DELAY FOR NEW DRUM	1535	71.0	2°C	6.60	1460		
	1611	76.0	2°C	6.56	1450		
	1621	81.0	2°C	6.60	1460		CLEARING - very sandy
	1630	86.0	2°C	6.71	1460		"
	1637	91.0	2°C	6.61	1460		"
	1648	96.0	2°C	6.65	1450		"
	1656	~~81.0~~	2°C	6.61	1450		"
		101 GAL					Final Measurements

OVER

12/19

06-MW-07 (cont'd.)

Time	Vol	Temp	pH	Cond	Turb.	Comments
1707	~~86.0~~ 106.0	2°C	6.62	1460	Almost Clear	- some sand Imhoff Cone
1727	—	—				- WATER LEVEL 23.60'

DEV.

GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09MW05 15* MR
Date: 9-10-93
Time: 1747

Location: END OF RUNWAY
Weather: CLOUDY, WARM
Samplers: GAT / DRT

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0.0
Water Depth (ft. btoc): 12.74
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: WATERRA PUMP

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1805	—	—	—	—	—	Start
1809	5.0	2°C	6.78	1010	Semi-Clear-Sand	
1815	10.0	2°C	6.85	1040		
1828	15.0	3°C	6.89	1030		
1833	20.0	2°C	6.88	1030		
1840	25.0	2°C	6.85	1030		
1846	30.0	2°C	6.86	1020		
1852	35.0	2°C	6.86	1030		
1858	40.0	2°C	6.87	1030		
1904	45.0	2°C	6.84	1030		
1910	50.0	2°C	6.86	1030		Stop-E.O.D.
9-11 0831	55.0	1°C	6.57	1020	Very Clear - Minor sand	
0836	60.0	1°C	6.76	1010	"	
0842	65.0	1°C	6.80	1010	"	
0847	70.0	1°C	6.81	1010	"	New Drum
0855	75.0	1°C	6.82	1010	"	
0900	80.0	1°C	6.83	1010	"	
0905	85.0	1°C	6.77	1010	"	
0909	90.0	1°C	6.81	1010	"	
0914	95.0	1°C	6.80	1010	"	
0922	100.0	1°C	6.84	1010	"	-Imhoff Cone
0928	—	—	—	—	—	12.51' water Depth
						Final Measurements

* 2nd attempt (lost surge block first time) ~~Will have to~~.
Redevelopment successful

Development
GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09MW ~~OJ~~ 15 *
Date: 9.8.93
Time: 1100

Location: WEST END OF RUNWAY
Weather: COLD (~36°F) P.C.
Samplers: DRT/GAT

Comments:

FINAL IMHOFF CONE <0.5 ml

Field Measurements

HNU/OVA Reading (ppm): 7.0
Water Depth (ft. btoc): 13.84
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 37.62
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1102	—	—	—	—	—	
1130	5.0	2°C		970		Almost Clear
1135	10.0	2°C	6.79	980		
1142	15.0	2°C	6.78	980		Sandy
1246	20.0	2°C	6.75	980		"
1252	25.0	2°C	6.79	970		"
1257	30.0	2°C	6.76	980		"
1303	35.0	2°C	6.77	970		"
1308	40.0	2°C	6.79	970		"
1313	45.0	2°C	6.80	970		"
1316	50.0	2°C		970		"
1320	—	—	—	—		Imhoff Cone
						Final Measurements

* 1st attempt at developing well. Surge block came off in well (unknown to developers) Could not retrieve. Will have to redevelop well with new surge block.

0

DEVELOPMENT
GROUNDWATER ~~SAMPLING~~ LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10MW04
Date: 9-6-93
Time: 1155

Location: EAST ALERT HANGAR (S.E. CORNER)
Weather: RAINING 11°C
Samplers: GAT, DRT

Comments:

FINAL IMHOFF CONE <0.5 ml

Field Measurements

HNU/OVA Reading (ppm): 2.4
Water Depth (ft. btoc): 15.16 ft. / 14.92
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc): 35.14 ft.
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: WATERA - 1" ID

Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1215	—	—	—	—	—	
1234	5.0	2 °C	6.79	1050	DK BROWN	
1242	10.0	1 °C	6.83	1060	" "	
1250	15.0	1 °C	6.83	1070	" "	
1255	20.0	1 °C	6.86	1070	LT. BROWN	
1305	25.0	1 °C	6.85	1050	" "	
9 6 1310	30.0	1 °C	6.87	1070	" "	
1316	35.0	1 °C	6.89	1050	" "	
1324	40.0	1 °C	6.87	1070	" "	
1333	45.0	1 °C	6.88	1090	Semi-Clear	-Imhoff Cone (1.2 at 4HRS)
1342	50.0	1 °C	6.86	1090	" "	
1351	55.0	1 °C	6.91	1090	" "	
1356	60.0	1 °C	6.91	1080	" "	
1407	65.0	1 °C	6.92	1090	Almost Clear	-Imhoff Cone (0.8 at 4HRS)
1424	70.0	1 °C	6.89	1080	"	
0915	—	—	—	—	—	
9.7 0925	75.0	1 °C	6.73	1080	LT. BROWN	
0935	80.0	1 °C	6.78	1090	Semi-Clear	
0943	85.0	1 °C	6.80	1090	"	
0951	90.0	1 °C	6.82	1100	"	
0959	95.0	1 °C	6.80	1110	"	
35 min pause 1005	100.0	1 °C	6.83	1100	"	Imhoff Cone
1042	105.0	1 °C	6.71	1110	"	
						Final Measurements

OVER

10-MW-04 (cont'd.)

Time	Vol.	Temp.	pH	Cond.	Turb.	Comments
1051	110.0	1°C	6.79	1100	Semi, Clean	
1059	115.0	1.°C	6.79	1090	Almost Clean	
1107	120.0	1°C	6.77	1100	"	
1116	125.0	1°C	6.82	1100	"	
1124	130.0	1°C	6.85	1100	"	Imhoff Cone
1135	135	1°C	6.80	1100		
1143	140	1°C	6.80	1110		

1328 W/L = 14.88

1992 Groundwater Sampling Forms

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-2-92 LOG TIME 1439
LOCATION ID 01-mw-01
SAMPLE TYPE N SAMPLE ID 01-mw-01-01

INITIAL GROUNDWATER DEPTH (FT) 16.75 td: 49.94
SAMPLING PERIOD: START 1550 COMPLETE 1610
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-3-92

COMMENTS OVM - 0ppm BH ; 0ppm 132
recalibrate pH meter buffer 7 set to 7.0, buffer 4 set to 4.0

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.2	
SPECIFIC CONDUCTANCE	SC	μmhos/c	577	
REDOX POTENTIAL	Eh	mvolts	-22	
TEMPERATURE	TEMP	°C	1.4	
ALKALINITY ($CaCO_3$	ALK	mg/l	692	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1439	0.0	--	--	--	START PUMPING
1459	15.0	4.4	611	2.3	recalibrate meter
1505	20.0	5.5	593	1.9	
1514	25.0	5.5	586	1.4	
1519	30.0	5.7	586	1.4	
1525	35.0	5.7	586	1.3	
1530	40.0	6.1	588	1.4	recheck calibration
1537	45.0	6.4	552	1.5	
1540	480	6.5	558	1.3	
1544	50.0	6.2	577	1.4	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID Galena LOG DATE 9-9-92 LOG TIME 1610

LOCATION ID 01mw02

SAMPLE TYPE N SAMPLE ID 01-mw-02-01

INITIAL GROUNDWATER DEPTH (FT) 15.87 td: 29.8

SAMPLING PERIOD: START 1610 COMPLETE 1630

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-10-92

COMMENTS Sunny, 35°, OVm: 0.0 ppm. BH
Dup for 01-05-07 ; MS/MSD collected 9-10-92 @1200

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.6	
SPECIFIC CONDUCTANCE	SC	μmhos/c	865	
REDOX POTENTIAL	Eh	mvolts	67	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	780	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1530	0.0	--	--	--	START PUMPING
1536	5	7.0	850	1.1	
1544	10	6.7	840	0.7	
1550	20	6.7	840	0.9	
1610	25	6.6	865	1.6	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID Galena LOG DATE 9-9-92 LOG TIME 1610
LOCATION ID 01-MW-02
SAMPLE TYPE D SAMPLE ID 01-DS-07

INITIAL GROUNDWATER DEPTH (FT) 15.87 td=29.8
SAMPLING PERIOD: START 1610 COMPLETE 1630
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-10-92

COMMENTS Dup for 01-MW-02-01

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.6	
SPECIFIC CONDUCTANCE	SC	µmhos/c	865	
REDOX POTENTIAL	Eh	mvolts	107	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	772	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1530	0.0	--	--	--	START PUMPING
1610	25	6.6	865	1.6	See formfor
					01-MW-02-01

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-9-92 LOG TIME 1625
LOCATION ID 01-MW-03
SAMPLE TYPE N SAMPLE ID 01-MW-03-01

INITIAL GROUNDWATER DEPTH (FT) 16.44 td=28.30
SAMPLING PERIOD: START 1625 COMPLETE 1645
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-10-92

COMMENTS Sunny, 35°. Dup for DS-06

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	916	
REDOX POTENTIAL	Eh	mvolts	91	
TEMPERATURE	TEMP	°C	1.2	
ALKALINITY ($CaCO_3$	ALK	mg/l	832	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1530	0.0	--	--	--	START PUMPING
1539	3	6.8	860	0.8	
1545	6	6.8	859	0.5	
1555	10				purged dry
1615	15	6.7	899	0.9	
1625	20	6.7	916	1.2	Start sampling

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-9-92 LOG TIME 1025
LOCATION ID 01-MW-03
SAMPLE TYPE D SAMPLE ID 01-DS-010

INITIAL GROUNDWATER DEPTH (FT) 1044 td-28.30
SAMPLING PERIOD: START 1025 COMPLETE 1045
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-10-92

COMMENTS Duplicate of 01-MW-03

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	9,16	
REDOX POTENTIAL	Eh	mvolts	91	
TEMPERATURE	TEMP	°C	1.2	
ALKALINITY ($CaCO_3$	ALK	mg/l	840	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1530	0.0	--	--	--	START PUMPING
1025	20	6.7	916	1.2	See form for
					01-MW-03-01

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-9-92 LOG TIME 1220
LOCATION ID 01-mw-04
SAMPLE TYPE N SAMPLE ID 01-mw-04-01

INITIAL GROUNDWATER DEPTH (FT) 14.11 td: 22.62 purge vol. 10 gal
SAMPLING PERIOD: START 1220 COMPLETE 1240
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-10-92

COMMENTS Clearing, Cold. OVM: 0ppm BH.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	4.9*	meter out of cal.
SPECIFIC CONDUCTANCE	SC	μmhos/c	595	
REDOX POTENTIAL	Eh	mvolts	133	
TEMPERATURE	TEMP	°C	2.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	648	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1135	0.0	--	--	--	START PUMPING
1138	2	5.8*	505	2.8	
1151	8	4.9	638	2.9	
1207	16	4.9	626	2.9	
1218	24	4.9	595	2.7	end purge

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-9-92 LOG TIME 1100
LOCATION ID 01-MW-05
SAMPLE TYPE N SAMPLE ID 01-MW-05-a

INITIAL GROUNDWATER DEPTH (FT) 110.09 td: 25.89
SAMPLING PERIOD: START 1100 COMPLETE 1120
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-10-92

COMMENTS OVM: 0 ppm BH; partly cloudy, cool; flurries.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	μmhos/c	440	
REDOX POTENTIAL	Eh	mvolts	45	
TEMPERATURE	TEMP	°C	1.8	
ALKALINITY ($CaCO_3$	ALK	mg/l	600	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1020	0.0	--	--	--	START PUMPING
1030	7	7.11		2.0	meter #91 battery low - switched to #90
1040	15	6.5	296	1.5	
1050	20	6.8	450	1.9	and falling - meter bat. low.
1100	25	7.0	440	1.8	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 9-2-92 LOG TIME 1530
LOCATION ID 01MW06
SAMPLE TYPE N SAMPLE ID 01-MW-06-01

INITIAL GROUNDWATER DEPTH (FT) 15.46 td27.00
SAMPLING PERIOD: START 1640 COMPLETE 1700
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-3-92

COMMENTS OVM: BZ-3ppm, BH 29ppm

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	650	
REDOX POTENTIAL	Eh	mvolts	60	
TEMPERATURE	TEMP	°C	1.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	780	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1530	0.0	--	--	--	START PUMPING
1535	2.5	6.6	640	1.6	
1549	5	6.6	636	1.3	
1622	10	6.7	645	1.5	
1629	13	5.7	667	1.2	recheck PH meter
1639	14	6.8	650	1.5	O.K. now.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-20-92 LOG TIME 0710
LOCATION ID 02GW01
SAMPLE TYPE N SAMPLE ID 02-GW-01-01

INITIAL GROUNDWATER DEPTH (FT) purged well line 20 min at flow rate ~10 gal/min
SAMPLING PERIOD: START 0710 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-21-92

COMMENTS Base water supply well #1

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	237	
REDOX POTENTIAL	Eh	mvolts	-39	
TEMPERATURE	TEMP	°C	4.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	446	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID QQ10ma LOG DATE 9·20·92 LOG TIME 0820
LOCATION ID 02·GW·02
SAMPLE TYPE N SAMPLE ID 02·GW·02·01

INITIAL GROUNDWATER DEPTH (FT) --
SAMPLING PERIOD: START 0820 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-21-92

COMMENTS

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.1	
SPECIFIC CONDUCTANCE	SC	μmhos/c	240	
REDOX POTENTIAL	Eh	mvolts	-84	
TEMPERATURE	TEMP	°C	5.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	240	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 10-5-92 LOG TIME 1500
LOCATION ID 02-GW-03
SAMPLE TYPE N SAMPLE ID 02-GW-03-01

INITIAL GROUNDWATER DEPTH (FT) —
SAMPLING PERIOD: START 1500 COMPLETE 1510
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-6-92

COMMENTS
new base water supply well in water plant

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	took bottle back
SPECIFIC CONDUCTANCE	SC	µmhos/c	304	to office to
REDOX POTENTIAL	Eh	mvolts	085 ?	make measurements.
TEMPERATURE	TEMP	°C	–	
ALKALINITY ($CaCO_3$	ALK	mg/l	240	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1500	0.0	--	--	--	START PUMPING
					no purging
					(let small amount
					of water to clean lines--
					~~and~~ well in constant
					use.)

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 10-5-92 LOG TIME 1500
LOCATION ID 02 GW03
SAMPLE TYPE D SAMPLE ID 02-DD01

INITIAL GROUNDWATER DEPTH (FT) —
SAMPLING PERIOD: START 1500 COMPLETE 1510
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-6-92

COMMENTS new base water supply well in water plant.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	298	
REDOX POTENTIAL	Eh	mvolts	0107	→ took bottle back
TEMPERATURE	TEMP	°C	-	to office for
ALKALINITY ($CaCO_3$	ALK	mg/l	242	measurements

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1500	0.0	--	--	--	START PUMPING
					no purging.
					(let small amount
					of water run to
					clean lines - well
					in constant use.)

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 10-5-92 LOG TIME 1515
LOCATION ID 02-GW04
SAMPLE TYPE N SAMPLE ID 02-GW04-01

INITIAL GROUNDWATER DEPTH (FT) —
SAMPLING PERIOD: START 1515 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-6-92

COMMENTS Backup base water supply well. not used in several months 200 ft deep. probably not a good sample (not purged enough.)

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	269	
REDOX POTENTIAL	Eh	mvolts	013 →	probley not valid:
TEMPERATURE	TEMP	°C	→	measured in office.
ALKALINITY ($CaCO_3$	ALK	mg/l	240	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1515		7.0	269	-	purged a couple gallons to
					clean lines would have to
					drain many more to purge
					the well as this well
					has not been used in months
					should be sampled in summer
					when many gallons are
					used daily to wet roads;
					petroleum odor in pump
					building.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALTIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Old Town Galena LOG DATE 9-14-92 LOG TIME 1630

LOCATION ID 03-GW-01

SAMPLE TYPE N SAMPLE ID 03-GW-01-01

INITIAL GROUNDWATER DEPTH (FT) —

SAMPLING PERIOD: START 1605 COMPLETE 1700

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-15-92

COMMENTS Edwin & Dorothy Fears Domestic well. Sampled from faucet at pressure tank.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.3	
SPECIFIC CONDUCTANCE	SC	μmhos/c	253	
REDOX POTENTIAL	Eh	mvolts	-132	
TEMPERATURE	TEMP	°C	2.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	316	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1605	0.0	--	--	--	START PUMPING
1630	-	7.3	253	2.7	Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Old Town Galena LOG DATE 9-14-92 LOG TIME 1730
LOCATION ID 03-GW-02-01
SAMPLE TYPE N SAMPLE ID 03-GW-02-01

INITIAL GROUNDWATER DEPTH (FT) —
SAMPLING PERIOD: START 1720 COMPLETE 1730
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-15-92

COMMENTS Daniel Patricks Domestic well. Sampled at faucet before filter unit.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	μmhos/c	3.31	
REDOX POTENTIAL	Eh	mvolts	-110	
TEMPERATURE	TEMP	°C	3.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	488	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1730	–	7.0	331	3.5	Sampled.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALTIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID old town galena LOG DATE 10-5-92 LOG TIME 1100
LOCATION ID 03 GW03
SAMPLE TYPE N SAMPLE ID 03-GW-03-01

INITIAL GROUNDWATER DEPTH (FT) -
SAMPLING PERIOD: START 1100 COMPLETE 1130
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-6-92

COMMENTS Norman Burgett and Roland Chadbournes Well-west end of old Galena, on the River.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.0	@8.7°c measurment temp.
SPECIFIC CONDUCTANCE	SC	μmhos/c	459	"
REDOX POTENTIAL	Eh	mvolts	50 →	Probably changed
TEMPERATURE	TEMP	°C	-	took sample to off [illegible]
ALKALINITY ($CaCO_3$	ALK	mg/l	315	for measurments

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1045	0.0	--	--	--	START PUMPING
					allowed well to run
					for 15min to clear
					line from River.
					~1L/5sec

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID old town galena LOG DATE 10-5-92 LOG TIME 1100

LOCATION ID 03-GW-03

SAMPLE TYPE D SAMPLE ID 03-DS-01

INITIAL GROUNDWATER DEPTH (FT) –

SAMPLING PERIOD: START 1100 COMPLETE 1130

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 10-6-92

COMMENTS field duplicate of 03-GW-03-01 - D. Burgetts and R. Chadbournes well.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	@ 8.7°C meas. temp
SPECIFIC CONDUCTANCE	SC	µmhos/c	457	"
REDOX POTENTIAL	Eh	mvolts	-36 - not	a good number.
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l	316	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1045	0.0	--	--	--	START PUMPING
					allowed water to
					run for 15 minutes
					to clear line from
					River.
					~1 L/5 sec.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID ~~galena~~ Old town LOG DATE 10-5-92 LOG TIME 1015

LOCATION ID 03-GW-04

SAMPLE TYPE N SAMPLE ID 03-GW-04-01

INITIAL GROUNDWATER DEPTH (FT) —

SAMPLING PERIOD: START 1015 COMPLETE 1045

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 10-6-92

COMMENTS Well @ Hobo's Yukon Inn.

FINAL PARAMETER MEASUREMENTS:			measured in office	measured at well head ~~COMMENTS~~
POTENTIAL OF HYDROGEN	pH	S.U.	6.3	5.9
SPECIFIC CONDUCTANCE	SC	µmhos/c	513	525
REDOX POTENTIAL	Eh	mvolts	-007	100
TEMPERATURE	TEMP	°C	—	5.5
ALKALINITY ($CaCO_3$	ALK	mg/l	414	—

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1015	0.0	--	--	--	START PUMPING
					Well only 52' deep
					someone just finished
					a load of laundry - no
					need to purge (By-
					passed holding tank,
					but goes through filter -
					Sears model #
					329.347300

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-2-92 LOG TIME 1115

LOCATION ID 04mw02

SAMPLE TYPE N SAMPLE ID 04-mw-02-01

INITIAL GROUNDWATER DEPTH (FT) 17.14 td=18.06

SAMPLING PERIOD: START 1900 COMPLETE 1930

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE ROS DATE SENT 9-3-92

COMMENTS not enough water to use waterra. purged as much water as possible, then came back later to sample with bailer. Flush mount well has been run over by heavy equipment.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	5.9	
SPECIFIC CONDUCTANCE	SC	μmhos/c	570	
REDOX POTENTIAL	Eh	mvolts	185	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	580	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1115	0.0	--	--	--	START PUMPING
1125	0.1	-	-	-	not enough water to
					fill waterra tubing.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID 001000 LOG DATE 9-2-92 LOG TIME 1120
LOCATION ID 04mw03
SAMPLE TYPE N SAMPLE ID 04-mw03-01

INITIAL GROUNDWATER DEPTH (FT) 12.16 td-22.94
SAMPLING PERIOD: START 1200 COMPLETE 1220
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-3-92

COMMENTS OVM BH-0ppm, BZ-0ppm.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.1	
SPECIFIC CONDUCTANCE	SC	μmhos/c	632	
REDOX POTENTIAL	Eh	mvolts	-88	
TEMPERATURE	TEMP	°C	9.2	
ALKALINITY ($CaCO_3$	ALK	mg/l	598	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1120	0.0	--	--	--	START PUMPING
1126	2	6.5	712	8.4	very muddy water
1136	6	6.6	681	8.7	"
1142	10	6.5	667	8.6	"
1150	14	6.3	637	9.0	"
1154	16	6.1	632	9.2	"

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-6-92 LOG TIME 1000
LOCATION ID 04mw-03
SAMPLE TYPE N-resample SAMPLE ID 04 mw-03-01

INITIAL GROUNDWATER DEPTH (FT) see initial log form
SAMPLING PERIOD: START 1040 COMPLETE 1050
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-7-92

COMMENTS Calibrate pH meter at site. OVM=0
Resampling for 8015 and 8010

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.9	
SPECIFIC CONDUCTANCE	SC	μmhos/c	672	
REDOX POTENTIAL	Eh	mvolts	-86	
TEMPERATURE	TEMP	°C	7.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	see initial log form.	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1000	0.0	--	--	--	START PUMPING
1025	10	6.6	670	7.7	
1030	15	6.7	676	7.7	
1035	17	6.9	680	7.8	
1040	18	6.9	672	7.7	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/22/92 LOG TIME 1635
LOCATION ID 05 mw01
SAMPLE TYPE N SAMPLE ID 05-MW-01-01

INITIAL GROUNDWATER DEPTH (FT) 22.75 td=53.88
SAMPLING PERIOD: START 1635 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/23/92

COMMENTS

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	µmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1530		6.3	506	1.3	Start purge
1541	5				* pH meter died
	10				- unable to get any
	15				pH data.
	20				
	25				
	30				
1635	35				Sampled

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

Resample

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 10-1-92 LOG TIME 1628

LOCATION ID 05 mw01

SAMPLE TYPE N resample SAMPLE ID 05-MW-01-01

INITIAL GROUNDWATER DEPTH (FT) td=53.88

SAMPLING PERIOD: START 1628 COMPLETE

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 10-2-92

COMMENTS OVM 0ppm BH, 0ppm BZ- no functioning PH meter. Will purge 45 gallons

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	μmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1505	0.0	--	--	--	START PUMPING
1525	5				
1532	10				
1540	15				
1555	20				
1604	25				
1613	30				
1618	35				
1620	40				
1628	45				

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID QQ1800 LOG DATE 9-13-92 LOG TIME 1810
LOCATION ID 05MW02
SAMPLE TYPE N SAMPLE ID 05MW02-01

INITIAL GROUNDWATER DEPTH (FT) 20.78 td.50.48
SAMPLING PERIOD: START 1755 COMPLETE 1815
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-14-92

COMMENTS Ovm out - to much moisture in air.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.3	
SPECIFIC CONDUCTANCE	SC	μmhos/c	333	
REDOX POTENTIAL	Eh	mvolts	27	
TEMPERATURE	TEMP	°C	1.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	488	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1710	0.0	--	--	--	START PUMPING
1720	8	6.2	326	2.0	
1730	15	6.3	333	1.0	
1740	25	6.3	330	1.3	
1750	35	6.3	333	1.3	Switch to Watera
1755	37				Start sampling.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9/21/92 LOG TIME 1644
LOCATION ID OS MW03
SAMPLE TYPE N SAMPLE ID OS-MW-03-01

INITIAL GROUNDWATER DEPTH (FT) 19.18 td=53.72
SAMPLING PERIOD: START 1644 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/22/92

COMMENTS 34°, cloudy. snow on ground.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	527	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	2.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	788	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1600	0.0	--	--	--	START PUMPING
1611	5	7.9	397	1.2	
1617	10	7.5	424	1.7	
1621	15	7.2	439	1.7	
1629	20	7.1	517	1.9	
1635	25	7.0	524	2.0	
1638	30	7.0	527	2.0	
1644	39	7.0	527	2.0	

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/22/92 LOG TIME 1306
LOCATION ID 05MW-04
SAMPLE TYPE N SAMPLE ID 05 MW0401

INITIAL GROUNDWATER DEPTH (FT) 18.71 td: 49.20
SAMPLING PERIOD: START 1306 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/23/92

COMMENTS

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.1	
SPECIFIC CONDUCTANCE	SC	μmhos/c	696	
REDOX POTENTIAL	Eh	mvolts	-118	
TEMPERATURE	TEMP	°C	1.1	
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1209	0.0	--	--	--	START PUMPING
1232	5	7.0	731	1.2	product on water
1240	10	5.7	715	1.1	
1242	15	5.2	713	1.1	
1244	20	5.6	725	1.2	
1254	25	5.8	724	1.1	
1256	30	6.4	718	1.1	
1304	35	5.8	696	1.1	
1306	38	6.1	696	1.1	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

Resample

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 10-1-92 LOG TIME 1225
LOCATION ID 05MW04
SAMPLE TYPE N SAMPLE ID 05MW0401

INITIAL GROUNDWATER DEPTH (FT) 20.55 td.49.20
SAMPLING PERIOD: START 1225 COMPLETE 1227
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-2-92

COMMENTS OVM - 1.7 ppm BH, OBZ.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	μmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1115	0.0	--	--	--	START PUMPING
1130	10	6.7*			meter not working
1138	18				unable to get
1150	25				readings
1205	40				
1225					Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-21-92 LOG TIME 1127
LOCATION ID 05MW-05
SAMPLE TYPE N SAMPLE ID 05-MW-05-01

INITIAL GROUNDWATER DEPTH (FT)
SAMPLING PERIOD: START 1127 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-22-92

COMMENTS OVM=0

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.9	
SPECIFIC CONDUCTANCE	SC	µmhos/c	659	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	0.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	900	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
* 1057	5	6.9	653	0.7	
1102	10	7.0	661	0.8	
1107	15	6.8	683	0.8	
1111	20	6.8	683	0.7	
1115	25	6.9	678	0.7	
1120	30	6.9	669	0.7	
1127	36	6.9	659	0.7	
*obvious dense product in BBL.					

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-20-92 LOG TIME 1645
LOCATION ID 05MW06
SAMPLE TYPE N SAMPLE ID 05MW0601

INITIAL GROUNDWATER DEPTH (FT) 110.61 td: 49.66
SAMPLING PERIOD: START 1645 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-21-92

COMMENTS

FINAL PARAMETER MEASUREMENTS:				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	622	
REDOX POTENTIAL	Eh	mvolts	93	
TEMPERATURE	TEMP	°C	3.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	716	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1615	9	5.2	678	3.8	
1625	18	6.3	665	3.5	
1636	27	6.7	633	3.2	
1645	37	6.7	622	3.1	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

Resample

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 10-1-92 LOG TIME 1200
LOCATION ID 05MW06
SAMPLE TYPE N →Resample SAMPLE ID 05MW06-01

INITIAL GROUNDWATER DEPTH (FT) 18.48 td-49.66
SAMPLING PERIOD: START 1200 COMPLETE 1215
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-2-92

COMMENTS OVM: 20 BH, 0 BZ. set pH meter to 7.0 at 1100.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	µmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1100	0.0	--	--	--	START PUMPING
1110	5	6.4	1040	3.2	pH meter not working
1115	10			3.2	will continue to
1140	25				purge 35+ gal.
1145	30				will sample now-
1200	40				no readings.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID QQ1QQQ LOG DATE 9-13-92 LOG TIME 1500

LOCATION ID 05MW07

SAMPLE TYPE N SAMPLE ID 05MW0701

INITIAL GROUNDWATER DEPTH (FT) 17.78 td: 28.35

SAMPLING PERIOD: START 1450 COMPLETE 1500

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-14-92

COMMENTS Rain, Cooler - almost sleet
MS/MSD taken

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	10.4	
SPECIFIC CONDUCTANCE	SC	µmhos/c	6910	
REDOX POTENTIAL	Eh	mvolts	099	
TEMPERATURE	TEMP	°C	1.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	1056.0	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1420	0.0	--	--	--	START PUMPING
1425	3	8.2	1080	1.8	
1430	6	9.7	1087	1.7	pH meter possibly fouling
1434	9	9.7	703	1.7	
1440	12	10.1	698	1.7	
1445	15	10.4	698	1.7	
1449	17	10.9	696	1.7	Switched to watera

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-13-92 LOG TIME 1225
LOCATION ID 05mw08
SAMPLE TYPE N SAMPLE ID 05mw0801

INITIAL GROUNDWATER DEPTH (FT) 16.39
SAMPLING PERIOD: START 1230 COMPLETE 1240
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-14-92

COMMENTS Ovm wet - no Readings

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	541	
REDOX POTENTIAL	Eh	mvolts	101	
TEMPERATURE	TEMP	°C	4.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	716	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1145	0.0	--	--	--	START PUMPING
1155	3	6.4	547	3.6	
1205	6	6.4	555	3.6	
1215	12	6.6	552	4.1	
1220	14	6.8	535	4.0	
1225	16	6.8	541	4.0	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galem LOG DATE 9-13-92 LOG TIME 1100
LOCATION ID 05 mw 09
SAMPLE TYPE N SAMPLE ID 05 mw 09 01

INITIAL GROUNDWATER DEPTH (FT) 18.92 td: 28.63
SAMPLING PERIOD: START 1100 COMPLETE 1125
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-14-92

COMMENTS duplicate 05-DS-08 collected at 05 mw 09.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	492	
REDOX POTENTIAL	Eh	mvolts	157	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	296	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1020	0.0	--	--	--	START PUMPING
1030	4	7.2	512	1.8	
1036	6	7.0	506	1.6	
1040	8	7.0	499	1.6	
1046	10	7.0	496	1.6	
1049	11	7.0	492	1.6	
1049	-				switched to watera.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID 001000 LOG DATE 9-13-92 LOG TIME 1100
LOCATION ID 05 mw-09
SAMPLE TYPE D SAMPLE ID 05 D5-08

INITIAL GROUNDWATER DEPTH (FT) 18.92
SAMPLING PERIOD: START 1100 COMPLETE 1125
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-14-92

COMMENTS

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	492.0	
REDOX POTENTIAL	Eh	mvolts	157.0	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	620.0	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-13-92 LOG TIME 1405
LOCATION ID OS mw-10
SAMPLE TYPE WG SAMPLE ID OS mw-10-01

INITIAL GROUNDWATER DEPTH (FT) 19.99 td: 30.06
SAMPLING PERIOD: START 1405 COMPLETE 1415
SAMPLING METHOD B LOGGER CODE RaD
LAB CODE ROS DATE SENT 9-14-92

COMMENTS temp 38°f - Rain

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	504	
REDOX POTENTIAL	Eh	mvolts	009	
TEMPERATURE	TEMP	°C	2.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	728	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1325	0.0	--	--	--	START PUMPING
1330	3	6.8	478	2.8	
1338	5	6.4	500	2.1	
1343	7	6.5	501	2.1	
1348	9	6.6	503	2.1	
1354	12	6.7	504	2.1	switched to wattera

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/23/92 LOG TIME 1110
LOCATION ID 05MW11
SAMPLE TYPE N SAMPLE ID 05-MW-11-01

INITIAL GROUNDWATER DEPTH (FT) 21.15 td=28.17
SAMPLING PERIOD: START 1110 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/24/92

COMMENTS

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1283	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	0.4	
ALKALINITY ($CaCO_3$	ALK	mg/l	880	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1047	0.0	–	–	–	START PUMPING
1053	1.5	6.9	1423	0.7	
1056	3.0	6.9	1313	0.5	
1059	4.5	6.9	1306	0.5	
1103	6.0	6.8	1280	0.2	
1105	8.0	6.8	1283	0.4	
1110					Sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/23/92 LOG TIME 1345
LOCATION ID OS-MW-12
SAMPLE TYPE N SAMPLE ID OS-MW-12-01

INITIAL GROUNDWATER DEPTH (FT) 19.38 td=24.98
SAMPLING PERIOD: START 1345 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/24/92

COMMENTS

FINAL PARAMETER MEASUREMENTS:				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	µmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l	824	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1315	0.0	--	--	--	START PUMPING
1325	1	7.6	1050	0.7	purged dry
1331	2	6.6	1204	1.1	
1336	4	6.7	1201	1.3	
1337	5	6.7	1245	1.3	
1339	6	6.2	1258	1.4	
1342	7	6.8	1245	1.4	
1345	9	6.6	1224	1.4	Sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-27-92 LOG TIME 1457
LOCATION ID 010mw01
SAMPLE TYPE N SAMPLE ID 010mw01 01

INITIAL GROUNDWATER DEPTH (FT) 24.04 td=52.94
SAMPLING PERIOD: START 1457 COMPLETE 1512
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-28-92

COMMENTS 15° ambient temp.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1728	
REDOX POTENTIAL	Eh	mvolts	-039	
TEMPERATURE	TEMP	°C	5.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	1072	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1415	0.0	--	--	--	START PUMPING
1420	5	6.9	1645	5.3	
1430	10	6.8	1668	5.5	
1434	15	6.7	1691	5.3	
1441	20	6.8	1740	5.5	
1449	25	6.7	1771	5.4	
1457	33	6.7	1728	5.5	-39 mv Sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID QQ10QQ LOG DATE 9-27-92 LOG TIME 1020
LOCATION ID QQ-MW02
SAMPLE TYPE N SAMPLE ID QQMW0201

INITIAL GROUNDWATER DEPTH (FT) 20.92 td: 51.90
SAMPLING PERIOD: START 1020 COMPLETE 1050
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-28-92

COMMENTS 5°F ambient

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1330	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	4.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	812	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
0941	0.0	--	--	--	START PUMPING
0947	5	7.3	1597	4.0	
0952	10	6.8	1491	3.8	
0958	15	6.8	1463	4.2	
1003	20	7.2	1416	3.9	
1009	25	6.8	1375	3.7	
1014	30	6.7	1466	4.1	
1020	35	6.8	1330	4.0	Sampled

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-8-92 LOG TIME 1730
LOCATION ID 06mw03
SAMPLE TYPE N SAMPLE ID 06mw0301

INITIAL GROUNDWATER DEPTH (FT) 15.77 td=48.70
SAMPLING PERIOD: START 1730 COMPLETE 1740
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-9-92

COMMENTS wind from dump - odor of burning plastic.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.5*	
SPECIFIC CONDUCTANCE	SC	µmhos/c	873	
REDOX POTENTIAL	Eh	mvolts	62	
TEMPERATURE	TEMP	°C	4.8	
ALKALINITY (CaCO3	ALK	mg/l	608*	out of acid 9-8-92

*ran on 9-9-92

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1630	0.0	--	--	--	START PUMPING
1645	5	-	857	5.1	pH probe will not cal.
1652	10	-	845	5.0	
1657	15	-	851	5.0	
1659	20	-	851	4.9	
1702	25	-	855	4.8	
1708	30	-	864	4.8	
1714	37	-	865	4.6	switched to waterra
1729	38	-	873	4.8	Ready to Sample.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9·8·92 LOG TIME 1745
LOCATION ID 06MW03
SAMPLE TYPE D SAMPLE ID 060008

INITIAL GROUNDWATER DEPTH (FT) 15.77
SAMPLING PERIOD: START 1745 COMPLETE 1755
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-9-92

COMMENTS burning plastic odor from dump.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.3*	pH was on 9·9·92
SPECIFIC CONDUCTANCE	SC	μmhos/c	873	w/ new batteries
REDOX POTENTIAL	Eh	mvolts	62	in meter.
TEMPERATURE	TEMP	°C	4.8	
ALKALINITY ($CaCO_3$	ALK	mg/l	656	out of acid 9·8·92 Ran on 9·9·92

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
	see 06	mw	03 for log sheet.		

*calibration questionable.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-29-92 LOG TIME 1543
LOCATION ID 06MW04
SAMPLE TYPE N SAMPLE ID 06MW0401

INITIAL GROUNDWATER DEPTH (FT) 16.44 td=48.66
SAMPLING PERIOD: START 1543 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-30-92

COMMENTS Submersible pump is not working. Remaining well (including this one) must be hand pumped.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1645	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	4.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	772	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1448	0.0	--	--	--	START PUMPING
1514	5	6.6	1636	5.2	visible product.
1516	10	6.4	1678	5.2	
1522	15	6.4	1681	5.2	
1525	20	6.5	1674	5.2	
1533	25	6.5	1656	5.0	
1537	30	6.6	1656	5.0	
1543	36	6.7	1645	4.6	-96mv sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-27-92 LOG TIME 1200
LOCATION ID 00MW00 01
SAMPLE TYPE N SAMPLE ID 00MW0001

INITIAL GROUNDWATER DEPTH (FT) 21.80 td=29.97
SAMPLING PERIOD: START 1200 COMPLETE 1220
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-28-92

COMMENTS 10°f ambient temp.

FINAL PARAMETER MEASUREMENTS:				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1296	
REDOX POTENTIAL	Eh	mvolts	-079	
TEMPERATURE	TEMP	°C	3.5	
ALKALINITY (CaCO$_3$	ALK	mg/l	852	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1148	0.0	--	--	--	START PUMPING
1151	1.5	6.7	1242	2.6	
1153	3.0	6.7	1266	3.2	
1154	4.5	6.7	1282	3.4	
1156	6.0	6.7	1257	3.4	
1158	7.5	6.7	1291	3.4	
1200	10.0	6.7	1296	3.5	-79 mv Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 8·31·92 LOG TIME 1430
LOCATION ID 07mw01
SAMPLE TYPE N SAMPLE ID 07mw01 01

INITIAL GROUNDWATER DEPTH (FT) 3.66 td: 15.24
SAMPLING PERIOD: START 1505 COMPLETE 1600
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE ROS DATE SENT 9-1-92

COMMENTS OVM: 0ppm.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.9	* meter out of cal.
SPECIFIC CONDUCTANCE	SC	µmhos/c	753	
REDOX POTENTIAL	Eh	mvolts	-34	
TEMPERATURE	TEMP	°C	2.4	
ALKALINITY ($CaCO_3$	ALK	mg/l	625	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1430	0.0	--	--	--	START PUMPING
1440	2	8.8	737	2.3	dry after ~2 gal.
1450	3				dry after 1 more gal.
1500	4	8.8	753	2.4	
1505					Sampling

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

*pH meter malfunctioning. took ~~a~~ headspace sample + kept it ~~cold~~ cold.
pH measurement at office sample = [illegible]

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 8-31-92 LOG TIME 1605
LOCATION ID 07MW01
SAMPLE TYPE D SAMPLE ID 07-DS-09

INITIAL GROUNDWATER DEPTH (FT) 3.66 td=15.24
SAMPLING PERIOD: START 1645 COMPLETE 1605
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-1-92

COMMENTS duplicate readings for duplicate sample.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	8.00	*pH meter malfunctionin
SPECIFIC CONDUCTANCE	SC	µmhos/c	691	
REDOX POTENTIAL	Eh	mvolts	-86	
TEMPERATURE	TEMP	°C	3.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	1030	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1605	18	10.5?	691	3.3	pH meter malfunctioning

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

*pH meter malfunctioning. took 0 head space sample and kept it cold. pH measurement at office same day: 7.9-8.0.

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 9-6-92 LOG TIME 1615

LOCATION ID 07mw01

SAMPLE TYPE N, D SAMPLE ID 07mw0101 and 07DS-09

INITIAL GROUNDWATER DEPTH (FT) 4.21 td-16.78

SAMPLING PERIOD: START 1730 COMPLETE 1800

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-7-92

COMMENTS OVM#249 = 0.0ppm at 1600. pH meter #91. Resampling this well - see original groundwater quality sampling record for additional information.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	µmhos/c	615	
REDOX POTENTIAL	Eh	mvolts	-75	
TEMPERATURE	TEMP	°C	3.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	See original sheet.	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1615	0.0	--	--	--	START PUMPING
1622	2	6.5	628	4.0	well draws down Rapidly
1630	4	7.0	594	3.4	Same as above.
1640	6	6.9	603	3.5	
1650	8	6.9	654	4.0	
1700	10	6.8	617	3.3	
1706	12	6.8	635	3.1	
1719	14.5	6.8	615	3.1	

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 9-1-92 LOG TIME 1225
LOCATION ID 07MW02
SAMPLE TYPE N SAMPLE ID 07MW0201

INITIAL GROUNDWATER DEPTH (FT) 2.15 td=22.74
SAMPLING PERIOD: START 1430 COMPLETE 1450
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-2-92

COMMENTS Sheen on surface water around well. OVM OBH/OBZ.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.5	Used 1327 value; meter clogged.
SPECIFIC CONDUCTANCE	SC	μmhos/c	908	1450
REDOX POTENTIAL	Eh	mvolts	-161	
TEMPERATURE	TEMP	°C	2.7	Used 1327 value; water warmed during sampling.
ALKALINITY ($CaCO_3$	ALK	mg/l	740	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1225	0.0	--	--	--	START PUMPING
1240	5	7.3	843	2.1	
1259	10	7.1	871	2.4	turbid grey in color
1318	15	7.5	866	3.0	
1327	20	7.5	844	2.7	Rain; sample start 1430
1450	22	10.6	918	5.8	* Values not used in final
1540		7.9	869	4.4	dup sample started.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 9-1-92 LOG TIME 1225

LOCATION ID 07mw02

SAMPLE TYPE D SAMPLE ID 07DS10

INITIAL GROUNDWATER DEPTH (FT) 2.15 td:22.74

SAMPLING PERIOD: START 1540 COMPLETE 1600

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-9-92

COMMENTS Sheen on surface water around well. OVM: 0BH/0BZ.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	see 07mw02(cms) ⇒ 7.5
SPECIFIC CONDUCTANCE	SC	µmhos/c	857	
REDOX POTENTIAL	Eh	mvolts	-84	
TEMPERATURE	TEMP	°C	2.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	750	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1540	0	7.9	918	4.4	*questionable pit-
1550	3.0	6.8	857	2.7	warmed by sun.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID Campion LOG DATE 9-1-92 LOG TIME 1215
LOCATION ID 07MW03
SAMPLE TYPE N SAMPLE ID 07MW0301

INITIAL GROUNDWATER DEPTH (FT) 3.19 td=17.06
SAMPLING PERIOD: START 1400 COMPLETE 1425
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-2-92

COMMENTS OVM: 12 BH; <1 BZ.
1345 pH cal. check 7=7.0 4=4.0

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.4	
SPECIFIC CONDUCTANCE	SC	µmhos/c	827	
REDOX POTENTIAL	Eh	mvolts	-88	
TEMPERATURE	TEMP	°C	2.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	770	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1215	0.0	--	--	--	START PUMPING
1233	5	7.1	767	2.1	
1300	10	6.7	875	2.4	Rain showers - quit
1350	15	7.4	798	2.6	purging ~15 min.
1358	18	11.7*	827	2.9	*pH junction problem
					clogged.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALTIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Campion LOG DATE 9-1-92 LOG TIME 1115
LOCATION ID 07mw04
SAMPLE TYPE N SAMPLE ID 07mw0401

INITIAL GROUNDWATER DEPTH (FT) 21.23 td: 55.08
SAMPLING PERIOD: START 1300 COMPLETE 1325
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-2-92

COMMENTS OVM: 0 ppm. 1115 - Recalibrate pH meter, buffer 7 to 7.0, buffer 4 to 4.0.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	715	
REDOX POTENTIAL	Eh	mvolts	-66	
TEMPERATURE	TEMP	°C	1.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	725	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1115	0.0	--	--	--	START PUMPING
1125	5	6.6	756	2.3	
1132	10	7.0	746	1.7	
1140	15	5.3	733	1.6	
1152	20	6.7	740	1.6	
1209	25	7.1	734	1.5	
1219	30	5.4	746	1.5	recheck pH meter cal.
1230	35	7.0	705	1.7	
1245	40	7.0	715	1.7	
1300	-				sample.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-8-92 LOG TIME 1430
LOCATION ID 09mw01
SAMPLE TYPE N SAMPLE ID 09mw01-01

INITIAL GROUNDWATER DEPTH (FT) 13.92 td=47.66
SAMPLING PERIOD: START 1430 COMPLETE 1450
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-9-92

COMMENTS OVM 0.0 ppm BH. Wind from east; Intermittent odor of burning plastic during sampling. Oil stained soil 10' north of well.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.3*	pH=6.4 on 9-9-92
SPECIFIC CONDUCTANCE	SC	μmhos/c	830	-new batteries
REDOX POTENTIAL	Eh	mvolts	-061	in meter
TEMPERATURE	TEMP	°C	5.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	572	

*calibration questionable

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1315	0.0	--	--	--	START PUMPING
	5	-	-	-	PH probe will not cal.
1331	10	-	752	5.3	
1335	15	-	742	5.0	
1343	20	-	746	4.8	
1350	25	-	791	5.0	
1359	30	-	826	5.1	
1401	35	-	814	4.9	
1403	38	-	807	5.0	
1422	40	-	874	5.4	

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

LOCATION ID 09MW01

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1426	42	-	845	5.4	
1429	43	-	830	5.1	

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-8-92 LOG TIME 1430
LOCATION ID 09-MW01
SAMPLE TYPE D SAMPLE ID 09-DS-07

INITIAL GROUNDWATER DEPTH (FT) 13.82
SAMPLING PERIOD: START 1430 COMPLETE 1450
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-9-92

COMMENTS OVM-0.0 ppm BH. Intermittent burning plastic odor from dump. 0.1 stained soil 10' N of well

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.6*	pH-10.4 on 9-9-92
SPECIFIC CONDUCTANCE	SC	μmhos/c	830	w/ new batteries
REDOX POTENTIAL	Eh	mvolts	-066	in meter.
TEMPERATURE	TEMP	°C	5.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	566	

*meter calibration questionable.

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1315	0.0	--	--	--	START PUMPING
	see purge	log	for 09-MW-01-01		

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-29-92 LOG TIME 1050
LOCATION ID 09mw02
SAMPLE TYPE N SAMPLE ID 09-mw-02-01

INITIAL GROUNDWATER DEPTH (FT) 15.18 td.45.07
SAMPLING PERIOD: START 1050 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-30-92

COMMENTS hand pumped purge volume=34gal.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.3	
SPECIFIC CONDUCTANCE	SC	μmhos/c	1079	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	2.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	420	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1015	0.0	--	--	--	START PUMPING
1035	15	7.9	1227	3.6	for 5 and 10 gals. pH
1041	20	7.5	1125	2.9	meter not functioning
1046	25	7.4	1105	2.3	properly.
1050	30	7.3	1092	2.8	- SLEMV sampled.
1054	34	7.3	1079	2.0	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 9-15-92 LOG TIME 1415

LOCATION ID 09-mw-03

SAMPLE TYPE N SAMPLE ID 09 mw-03-01

INITIAL GROUNDWATER DEPTH (FT) 15.81 td=47.24

SAMPLING PERIOD: START 1353 COMPLETE

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-16-92

COMMENTS Ambient temp near 20°f.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	454	
REDOX POTENTIAL	Eh	mvolts	-042	
TEMPERATURE	TEMP	°C	2.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	536	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1	0.0	--	--	--	START PUMPING
1245	6	6.8	144	2.3	
1300	12	6.8	468	2.4	
1315	18	6.8	471	2.6	
1337	24	6.8	458	2.2	
1345	30	6.8	454	2.3	
1353	36	6.8	454	2.3	Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALTIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-15-92 LOG TIME 1415

LOCATION ID 09mw03

SAMPLE TYPE D SAMPLE ID 09.05-08

INITIAL GROUNDWATER DEPTH (FT) 15.81 td-47.24

SAMPLING PERIOD: START 1353 COMPLETE

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-16-92

COMMENTS Ambient air temp - 20°f.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	454	
REDOX POTENTIAL	Eh	mvolts	-42	
TEMPERATURE	TEMP	°C	2.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	684	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-9-92 LOG TIME 1815

LOCATION ID 09MW04

SAMPLE TYPE N SAMPLE ID 09MW0401

INITIAL GROUNDWATER DEPTH (FT) 17.05 td: 47.53

SAMPLING PERIOD: START 1815 COMPLETE 1830

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-10-92

COMMENTS 32° clear, breezy

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	μmhos/c	859	
REDOX POTENTIAL	Eh	mvolts	-012	
TEMPERATURE	TEMP	°C	2.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	680	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1745	0.0	--	--	--	START PUMPING
1749	5	6.7	681	2.8	clear
1759	10	6.7	850	2.6	
1802	15	6.6	855	2.7	
1806	20	6.7	855	2.6	
1809	25	6.7	853	2.7	
1812	30	6.6	864	2.6	
1815	35	6.7	859	2.7	

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-16-92 LOG TIME 1115

LOCATION ID 09mw05

SAMPLE TYPE N SAMPLE ID 09-mw-05-01

INITIAL GROUNDWATER DEPTH (FT) 13.90 td 47.10

SAMPLING PERIOD: START 1105 COMPLETE 1120

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-17-92

COMMENTS Ambient air temp 15°F -dropping. Overcast.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	449	
REDOX POTENTIAL	Eh	mvolts	-043	
TEMPERATURE	TEMP	°C	1.8	
ALKALINITY ($CaCO_3$	ALK	mg/l	444	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1030	0.0	--	--	--	START PUMPING
1034	5	7.1	444	1.6	
1042	20	6.6	451	1.8	
1045	25	6.7	450	1.8	
1055	30	6.7	450	1.8	
1058	35	6.8	450	1.8	
1100	38	6.5	449	1.5	Switched to Watera.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-16-92 LOG TIME 1430

LOCATION ID 09mw010

SAMPLE TYPE N SAMPLE ID 09-mw010-01

INITIAL GROUNDWATER DEPTH (FT) 12.03 td-46.84

SAMPLING PERIOD: START 1430 COMPLETE 1450

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-17-92

COMMENTS Overcast, cold, 30°

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	260	
REDOX POTENTIAL	Eh	mvolts	074	
TEMPERATURE	TEMP	°C	2.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	452	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
	0.0	--	--	--	START PUMPING
1410	10	6.8	278	2.0	
1415	20	6.8	267	2.0	
1420	30	6.8	264	2.0	
1425	39	6.8	260	2.0	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID Galena LOG DATE 9-15-92 LOG TIME 1725

LOCATION ID 09mw07

SAMPLE TYPE N SAMPLE ID 09mw07-01

INITIAL GROUNDWATER DEPTH (FT) 15.00 td=23.74

SAMPLING PERIOD: START 1725 COMPLETE

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-16-92

COMMENTS

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.9	
SPECIFIC CONDUCTANCE	SC	µmhos/c	457	
REDOX POTENTIAL	Eh	mvolts	40	
TEMPERATURE	TEMP	°C	1.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	632	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
11050	0.0	--	--	--	START PUMPING
11054	5	7.1	431	2.0	sub. pump impellers frozen
	10	6.8	458	1.6	had to thaw out to purge
	15	6.9	459	1.7	
	20	6.9	457	1.7	switched to watterra.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-30-92 LOG TIME 1140
LOCATION ID 09-mw08
SAMPLE TYPE N SAMPLE ID 09-mw-08-01

INITIAL GROUNDWATER DEPTH (FT) 26.10 to 28.44
SAMPLING PERIOD: START 1140 COMPLETE 1210
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-1-92

COMMENTS OVM-18.0 BH 1.0 BZ - Snowing - VOA's very hard to smple.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.9	
SPECIFIC CONDUCTANCE	SC	µmhos/c	623	
REDOX POTENTIAL	Eh	mvolts	-114	
TEMPERATURE	TEMP	°C	3.0	
ALKALINITY ($CaCO_3$	ALK	mg/l	972	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1110	0.0	--	--	--	START PUMPING
1116	1	7.0	618	3.1	well dry - Allowing to recharge
1125	3	6.9	629	3.0	"
1132	4.5	6.9	623	3.0	"
1140					Sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALTIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-28-92 LOG TIME 1446
LOCATION ID 09mw10
SAMPLE TYPE N SAMPLE ID 09mw-10-01

INITIAL GROUNDWATER DEPTH (FT) 40.11 td:43.85
SAMPLING PERIOD: START 1446 COMPLETE 1530
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-29-92

COMMENTS 16°F Ambient temp.

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1335	
REDOX POTENTIAL	Eh	mvolts	-079	
TEMPERATURE	TEMP	°C	2.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	656	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1415	0.0	--	--	--	START PUMPING
1437	2	7.2	1594	3.4	
1440	4	6.9	1352	3.1	
1443	6	6.8	1339	2.6	
1446	8	6.7	1335	2.5	-79 mv sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 9-28-92 LOG TIME 1446
LOCATION ID 09-mw-11
SAMPLE TYPE N SAMPLE ID 09-mw-11-01

INITIAL GROUNDWATER DEPTH (FT) 36.61 td 42.88
SAMPLING PERIOD: START 1631 COMPLETE 1700
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-29-92

COMMENTS 110°F Ambient temp

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	7.3	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1403	
REDOX POTENTIAL	Eh	mvolts	-138	
TEMPERATURE	TEMP	°C	1.6	
ALKALINITY ($CaCO_3$	ALK	mg/l	928	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1554	0.0	--	--	--	START PUMPING
1608	2	7.3	1120	2.0	
1611	4	6.9	1129	2.1	
1614	6	6.9	1382	1.9	
1620	8	7.0	1410	1.8	
1623	10	6.9	1410	2.4	
1631	13	7.3	1403	1.6	-138 mV Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-30-92 LOG TIME 1449
LOCATION ID 09-mw12
SAMPLE TYPE N SAMPLE ID 09mw12-01

INITIAL GROUNDWATER DEPTH (FT) 15.35 td:21.54
SAMPLING PERIOD: START 1449 COMPLETE 1510
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-1-92

COMMENTS OVM: 5.0 BH 41.0 BZ.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.9	
SPECIFIC CONDUCTANCE	SC	μmhos/c	569	
REDOX POTENTIAL	Eh	mvolts	-115	
TEMPERATURE	TEMP	°C	3.2	
ALKALINITY ($CaCO_3$	ALK	mg/l	904	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1340	0.0	--	--	--	START PUMPING
1352	5	7.2	522	3.0	heavy product odor
1358	10	7.3	593	3.0	
1407	15	7.0	596	2.6	
1422	20	7.0	573	2.7	
1434	25	6.9	557	2.9	
1449	32	6.9	569	3.2	-115mv Sampled.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-14-92 LOG TIME 1540
LOCATION ID 09-MW-14
SAMPLE TYPE N SAMPLE ID 09-MW-1401

INITIAL GROUNDWATER DEPTH (FT) 18.91
SAMPLING PERIOD: START 1540 COMPLETE 1550
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-15-92

COMMENTS odor of burning garbage noticable at site 1516.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.6	
SPECIFIC CONDUCTANCE	SC	μmhos/c	441	
REDOX POTENTIAL	Eh	mvolts	47.0	
TEMPERATURE	TEMP	°C	2.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	660.0	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1500	0.0	--	--	--	START PUMPING
1505	5	6.9	439	2.3	
1509	10	6.7	429	2.5	
1515	15	6.7	437	2.5	
1519	20	6.6	437	2.5	
1524	25	6.6	441	2.5	

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 10-1-92 LOG TIME 1443
LOCATION ID 09mw14
SAMPLE TYPE N SAMPLE ID 09-mw-14-01

INITIAL GROUNDWATER DEPTH (FT) 21.54 td:25.20
SAMPLING PERIOD: START 1443 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-2-92

COMMENTS OVM: BH-0 ; BZ:0

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.		
SPECIFIC CONDUCTANCE	SC	μmhos/c		
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C		
ALKALINITY ($CaCO_3$	ALK	mg/l		

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1415	0.0	--	--	--	START PUMPING
1419	2				no functioning pH
1421	4				meter - no Readings.
1426	5				dry well - Allow to
1443	12		sampled		recharge.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 9-7-92 LOG TIME 1135
LOCATION ID 10-MW-01
SAMPLE TYPE N SAMPLE ID 10-MW-01-01

INITIAL GROUNDWATER DEPTH (FT) 15.25 td-40.74
SAMPLING PERIOD: START 1230 COMPLETE 1245
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-8-92

COMMENTS OVM: BZ-0, BH-0

FINAL PARAMETER MEASUREMENTS:				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	703	
REDOX POTENTIAL	Eh	mvolts	-13	
TEMPERATURE	TEMP	°C	4.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	690	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1135	0.0	--	--	--	START PUMPING
1145	5	6.8	691	4.4	
1150	10	7.0	705	4.5	Black smoke overhead from nearby chimney
1155	15	6.9	726	4.3	"
1200	20	6.8	763	4.3	"
1205	25	6.8	737	4.3	"
1210	30	4.1	737	4.3	boiler furnace off. Recheck pH meter.
1218	37.5	4.9	702	4.3	meter way out of calibration. can't Recalibrate.
1222	40	5.0	715	4.3	all pH measurements
1226	45	4.7	703	4.3	after 1205 very questionable.

All other measurements very stable.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 10-4-92 LOG TIME 1640
LOCATION ID 10 MW01
SAMPLE TYPE N SAMPLE ID 10-MW-01-01
Resample

INITIAL GROUNDWATER DEPTH (FT) 19.14 td=46.44
SAMPLING PERIOD: START 1750 COMPLETE 1810
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-5-92

COMMENTS OVM BH 0ppm, BZ= 0ppm - Resample.
Check 7 buffer at site = 7.0

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.5*	
SPECIFIC CONDUCTANCE	SC	µmhos/c	597	
REDOX POTENTIAL	Eh	mvolts	60	
TEMPERATURE	TEMP	°C	3.5	
ALKALINITY ($CaCO_3$	ALK	mg/l	see original sampling log	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1640	0.0	--	--	--	START PUMPING
1655	5	6.3	645	3.4	weather is beautiful
1700	10	6.0	615	3.4	
1707	15	6.0	615	3.5	
1720	20	5.9	607	3.5	
1730	25	6.3	601	3.4	
1740	30	6.2	599	3.5	
1748	35	6.5	597	3.5	
					*these Readings look
					better than the initial-

may use in place of 9-7-92 values

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 9-7-92 LOG TIME 0950

LOCATION ID 10-MW-02

SAMPLE TYPE N SAMPLE ID 10-MW-02-01

INITIAL GROUNDWATER DEPTH (FT) 15.71 td-47.67

SAMPLING PERIOD: START 1100 COMPLETE 1130

SAMPLING METHOD B LOGGER CODE RAD

LAB CODE RAS DATE SENT 9-8-92

COMMENTS OVM=2.5 BH ; 1.0 BZ

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	5.9	
SPECIFIC CONDUCTANCE	SC	µmhos/c	881	
REDOX POTENTIAL	Eh	mvolts	-99	
TEMPERATURE	TEMP	°C	4.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	840	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
0950	0.0	--	--	--	START PUMPING
1005	10	5.8	912	4.2	
1009	15	5.7	906	4.2	
1019	20	5.3	905	4.1	
1025	25	6.3	893	4.2	
1029	30			4.0	
1040	37	6.9	884	4.0	
1042	40	6.2	889	4.1	
1045	42	5.9	881	4.1	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID Galena LOG DATE 9-7-92 LOG TIME 0950
LOCATION ID 10-MW-02
SAMPLE TYPE N SAMPLE ID 10-DS-010

INITIAL GROUNDWATER DEPTH (FT) 15.71
SAMPLING PERIOD: START 1100 COMPLETE 1130
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-8-92

COMMENTS pump: 2.5 BH; 1.0 BZ
dup. of 10-MW-02-02

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	5.9	
SPECIFIC CONDUCTANCE	SC	μmhos/c	881	
REDOX POTENTIAL	Eh	mvolts	-99	
TEMPERATURE	TEMP	°C	4.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	820	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
0950	0.0	--	--	--	START PUMPING
1005	10	5.8	912	4.2	
1009	15	5.7	906	4.2	
1019	20	5.3	905	4.1	
1025	25	6.3	893	4.2	
1029	30			4.0	
1040	37	6.9	884	4.0	
1042	40	6.2	889	4.1	
1045	42	5.9	881	4.1	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALTIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-7-92 LOG TIME 1530
LOCATION ID 10 MW03
SAMPLE TYPE N SAMPLE ID 10 MW03-02

INITIAL GROUNDWATER DEPTH (FT) 16.22 td 47.87
SAMPLING PERIOD: START 1520 COMPLETE 1530
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-8-92

COMMENTS OVM 1.6S, Blt =1.5

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	7.0	
SPECIFIC CONDUCTANCE	SC	µmhos/c	627	
REDOX POTENTIAL	Eh	mvolts	019	
TEMPERATURE	TEMP	°C	4.1	
ALKALINITY ($CaCO_3$	ALK	mg/l	590	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1400	0.0	--	--	--	START PUMPING
1412	5	-	720	4.5	
1416	10	6.6	585	3.6	
1425	15	6.9	589	3.5	
1436	20	6.7	599	3.5	
1443	25	6.9	587	3.1	
1450	30	6.9	584	3.2	
1455	36	6.9	579	3.1	
1520	37	7.0	627	4.1	Sampled
1530					finish sampling.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

INSTALLATION ID galena LOG DATE 10-7-92 LOG TIME 1535
LOCATION ID 11MW01
SAMPLE TYPE N SAMPLE ID 11-MW-01-01

INITIAL GROUNDWATER DEPTH (FT) 16.10 td-18.44
SAMPLING PERIOD: START 1615 COMPLETE 1635
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 10-8-92

COMMENTS OVM BH-0ppm. BZ-0ppm.
Rain - soft bottom.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.1	
SPECIFIC CONDUCTANCE	SC	μmhos/c	655	
REDOX POTENTIAL	Eh	mvolts	184	
TEMPERATURE	TEMP	°C	3.4	
ALKALINITY ($CaCO_3$	ALK	mg/l	660	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1535	0.0	--	--	--	START PUMPING
1540	1	5.7	851	4.7	
1545	2	6.2	761	4.0	
1555	3	6.0	703	3.5	
1600	4	6.2	673	3.5	
1605	5	6.0	668	3.5	
1610	6	6.1	655	3.4	Sample.

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9-27-92 LOG TIME 1615
LOCATION ID 11-MW02
SAMPLE TYPE N SAMPLE ID 11-MW-02-01

INITIAL GROUNDWATER DEPTH (FT) 16.94 td 21.30
SAMPLING PERIOD: START 1115 COMPLETE 1625
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9-28-92

COMMENTS 20°F Ambient temp.

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	1507	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	4.7	
ALKALINITY ($CaCO_3$	ALK	mg/l	740	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1545	0.0	--	--	--	START PUMPING
1559	2	6.8	1461	4.5	
1603	4	6.7	1501	4.7	
1607	6	6.7	1503	4.7	
1611	8	6.7	1509	4.6	
1615	11	6.7	1507	4.7	

SAMPLES TYPES: (WSACODE)

D - DUPLICATE FB - FIELD BLANK
R - REPLICATE TB - TRIP BLANK
S - SPIKE LB - LAB BLANK
K - KNOWN N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB SP- SUBMERSIBLE PUMP
B - BAILER AL - AIR-LIFT SAMPLER
PP - PERISTALIC PUMP BP - BLADDER PUMP
SL - SUCTION LIFT PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/23/92 LOG TIME 1625
LOCATION ID 12mw-01
SAMPLE TYPE N SAMPLE ID 12-mw-01-01

INITIAL GROUNDWATER DEPTH (FT) 15.88 td-28.93
SAMPLING PERIOD: START 1645 COMPLETE
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/24/92

COMMENTS

FINAL PARAMETER MEASUREMENTS: COMMENTS

POTENTIAL OF HYDROGEN	pH	S.U.	6.8	
SPECIFIC CONDUCTANCE	SC	μmhos/c	975	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	2.3	
ALKALINITY ($CaCO_3$	ALK	mg/l	492	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (μMHOS/CM)	TEMP (°C)	COMMENTS
1625	0.0	--	--	--	START PUMPING
1627	3	7.5	929	1.8	
1633	5	6.9	863	1.4	
1635	7	6.8	960	1.9	
1637	9	6.7	973	2.3	
1638	11	6.8	980	2.3	
1640	15	6.8	975	2.3	
1645					Sampled

SAMPLES TYPES: (WSACODE)

D - DUPLICATE
R - REPLICATE
S - SPIKE
K - KNOWN
FB - FIELD BLANK
TB - TRIP BLANK
LB - LAB BLANK
N - NORMAL

SAMPLE METHODS: (WSMCODE)

G - GRAB
B - BAILER
PP - PERISTALIC PUMP
SL - SUCTION LIFT PUMP
SP- SUBMERSIBLE PUMP
AL - AIR-LIFT SAMPLER
BP - BLADDER PUMP

GROUND WATER QUALITY SAMPLING RECORD

PAGE 1

INSTALLATION ID galena LOG DATE 9/23/92 LOG TIME 1520
LOCATION ID 12-MW-02
SAMPLE TYPE N SAMPLE ID 12MW0201

INITIAL GROUNDWATER DEPTH (FT) 13.89 td-26.13
SAMPLING PERIOD: START 1520 COMPLETE 1545
SAMPLING METHOD B LOGGER CODE RAD
LAB CODE RAS DATE SENT 9/24/92

COMMENTS

FINAL PARAMETER MEASUREMENTS:

				COMMENTS
POTENTIAL OF HYDROGEN	pH	S.U.	6.7	
SPECIFIC CONDUCTANCE	SC	µmhos/c	971	
REDOX POTENTIAL	Eh	mvolts		
TEMPERATURE	TEMP	°C	3.9	
ALKALINITY ($CaCO_3$	ALK	mg/l	504	

TIME	TOTAL VOLUME WITHDRAWN (GALLONS)	PH	SC (µMHOS/CM)	TEMP (°C)	COMMENTS
1520	0.0	--	--	--	START PUMPING
1525	2	6.6	924	3.6	
1530	6	6.6	957	3.9	
1534	10	6.5	970	3.9	
1537	12	6.6	970	3.5	
1540	14	6.7	971	3.9	
1545					sampled.

SAMPLES TYPES: (WSACODE)

D -	DUPLICATE	FB -	FIELD BLANK
R -	REPLICATE	TB -	TRIP BLANK
S -	SPIKE	LB -	LAB BLANK
K -	KNOWN	N -	NORMAL

SAMPLE METHODS: (WSMCODE)

G -	GRAB	SP-	SUBMERSIBLE PUMP
B -	BAILER	AL -	AIR-LIFT SAMPLER
PP -	PERISTALIC PUMP	BP -	BLADDER PUMP
SL -	SUCTION LIFT PUMP		

1993 Groundwater Sampling Forms

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01-MW-01
Date: 6/13/93
Time: 1155

Location: 01 (FTA)
Weather: Sunny and fairly warm, light breeze
Samplers: BJC and LCO.

Comments: Well cap was open because the transducer was in the well. ∴ No build up of any organic vapors. No noticeable odor, though. Transducer pulled at 1100. Meter check - Turbidimeter needed recalibration. pH 7.0 =

Field Measurements

HNU/OVA Reading (ppm): Ø* (BG. = Ø)
Water Depth (ft. btoc): 7.38
Product Thickness (ft.): -
Well Volume (gal.): 15.9
Purge Method: Waterra

Product Depth (ft. btoc): -
Well Depth (ft. btoc): 49.85
Saturated Thickness (ft.):
3 well volumes (gal.): 47.7
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1125	0	-	-	-	-	Begin purge
1130	5	2	6.67	1180	23	very clean water
1135	15	1.5	6.73	1190	22	
1138	20	2.0	6.74	1190	9.4	
1140	25	2.0	6.75	1200		
1142	30	1.5	6.75	1190	9.4	
1145	35	1.5	6.75	1180	8.2	
1148	40	2.0	6.78	1190	5.9	
1150	45	1.5	6.78	1200	~~4.7~~	Missed turbidity
1152	48	2.0	6.77	1200	4.7	Final Measurements

Alkalinity = 656 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01-MW-02
Date: ~~5~~ 6/13/93
Time: 0945

Location: 01 (FTA)
Weather: Sunny and cool, warming up
Samplers: BK and LCO.

Comments: Meter check: pH 7 = 7.05 OK
10 NTU = 9.99 ✓
0.5 NTU = 0.51 ✓

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0)
Water Depth (ft. btoc): 7.45
Product Thickness (ft.): —
Well Volume (gal.): 8.3

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 29.64
Saturated Thickness (ft.): 22.19
3 well volumes (gal.): ~~25.9~~ 24.9

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
0910	0	—	—	—	—	Begin purge
0919	5	2	6.65	1160	~~40~~ 92 ?	Very unstable turbidity.
0922	10	1	6.53	1200	—	very cold water!
0925	15	1	6.50	1190	188	Turbidity difficult to
0730	20	1.5	6.53	1190	150	measure → lots of
0937	25	1.5	6.54	1200	*176	sand in water which
						settles out rapidly with
						time shifting out bottom
						of cuvette. I'm allowing
						sand particles to settle
						then decanting and
						measuring suspended
						material.
						* This last reading
						was taken without
						decanting - it looked
						fairly stable
0937	25	1.5	6.54	1200	~~18~~ *176	Final Measurements

Alkalinity = 686 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 02-GW-01
Date: 6/15/93
Time: 1620

Location: Base Supply Well # 1
Weather: partly cloudy, cool
Samplers: BJC/LCO

Comments: Meter check - see 06-MW-04 resample log.

Field Measurements

HNU/OVA Reading (ppm): —
Water Depth (ft. btoc): —
Product Thickness (ft.): —
Well Volume (gal.): —

Product Depth (ft. btoc): —
Well Depth (ft. btoc): —
Saturated Thickness (ft.): —
3 well volumes (gal.): —

Purge Method: —
Sample Method: Spigot

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1650	0.5	4.5	6.93	480	0.7	Turbidity very low, but fluctuating ~~changing~~
					Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 02-GW-03
Date: 6/15/93
Time: 1615

Location: Base Supply Well #7
Weather: partly cloudy, cool
Samplers: BJC / LCO

Comments: Meter check – see 06-MW-04 resample log

Field Measurements

HNU/OVA Reading (ppm): –
Water Depth (ft. btoc): –
Product Thickness (ft.): –
Well Volume (gal.): –

Product Depth (ft. btoc): –
Well Depth (ft. btoc): –
Saturated Thickness (ft.): –
3 well volumes (gal.): –

Purge Method: –

Sample Method: Spiget

Time	Cum. Vol. (gal.)	Water Quality				Comments
		Temp.	pH	Cond	Turbidity	
1644	~~2.6~~ BJC 0.5	5	6.80	500	0.5	Turbidity very low, but fluctuating.
						Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: ~~0~~8 02-GW-07
Date: 6/17/93
Time: 1400

Location: Base Supply Well #7
Weather: Cloudy, Cool, Sprinkles
Samplers: LCO BJC

Comments: 02-GW ~~X~~ 03 DS-03 is a Duplicate Sample From This location

Field Measurements

HNU/OVA Reading (ppm): —
Water Depth (ft. btoc): —
Product Thickness (ft.): —
Well Volume (gal.): —

Product Depth (ft. btoc): —
Well Depth (ft. btoc): —
Saturated Thickness (ft.): —
3 well volumes (gal.): —

Purge Method: Spigot

Sample Method: Spigot

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1400	5	—	—	—	—	
						Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 03-GW-02
Date: 6/17/93
Time: 1445

Location: Danny Patrick's well
Weather: Partly cloudy, warm
Samplers: BJC

Comments: 03-GW-02-DS-03 is a duplicate sample from this location

Field Measurements

HNU/OVA Reading (ppm): –
Water Depth (ft. btoc): –
Product Thickness (ft.): –
Well Volume (gal.): –

Product Depth (ft. btoc): –
Well Depth (ft. btoc): ≈ 54 ft.
Saturated Thickness (ft.): –
3 well volumes (gal.): –

Purge Method: spigot

Sample Method: spigot

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1445	3	–	–	–	–	
						Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 03-GW-03
Date: 6/17/93
Time: 1435

Location: Norman Burgett's and Roland Chadbourne's well
Weather: Partly cloudy, warm
Samplers: BJC

Comments: ~~03-GW-03-DS-03 is a duplicate sample for BJC~~

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.):
Well Volume (gal.):

Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method: Spigot

Sample Method: Spigot

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1435	9					
						Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 03-GW-04
Date: 6/17/93
Time: 1420

Location: Hobo's Yukon Inn well
Weather: partly cloudy,
Samplers: BJC

Comments:

Field Measurements

HNU/OVA Reading (ppm): —
Water Depth (ft. btoc): —
Product Thickness (ft.): —
Well Volume (gal.): —

Product Depth (ft. btoc): —
Well Depth (ft. btoc): —
Saturated Thickness (ft.): —
3 well volumes (gal.): —

Purge Method: spigot

Sample Method: spigot

Time	Cum. Vol. (gal.)	Water Temp.	Quality pH	Cond	Turbidity	Comments
1420	5	—	—	—	—	
					Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 04-MW-02
Date: 6/6/93
Time: 16:45

Location: 04
Weather: Partly cloudy and warm
Samplers: BJC/LCO

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (BG = 0
Water Depth (ft. btoc): 9.17
Product Thickness (ft.): —
Well Volume (gal.): 3.3

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 18.02
Saturated Thickness (ft.): 8.85
3 well volumes (gal.): 10

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1600	0	10	6.43	1070	—	Begin purge
1605	2	7	6.42	1060		turbidity meter not calibrating
1611	5	5	6.43	970		
1617	7	5	6.60	960	57	Road traffic - 40 ft
1620	8	4	6.48	1060		
1625	10	4	6.56	1060		
1630	11	4	6.5	1060	66	Final Measurements

Alkalinity = 570

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 04-MW-03
Date: 6/6/93
Time: ~~1230~~ 1300 BJC

Location: 04
Weather: Warm, partly cloudy
Samplers: BJC LCO

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0)
Water Depth (ft. btoc): 8.02
Product Thickness (ft.): —
Well Volume (gal.):

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 22.87
Saturated Thickness (ft.): 14.85
3 well volumes (gal.): 16.8

Purge Method: Rediflo-2

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1230	0	—	—	—	—	Generator - began purge
1235	15	4	6.55	1110	11	
1240	20	3.5	6.57	1110	5.5	
1241	22	3.5	6.61	1110	9.5	Turbidity meter malfunctioning. These numbers are way too low.
12:46	25	3.5	6.6	1080	~~3.6~~ 1?	Final Measurements

Alkalinity = 650 mg/L

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-01
Date: 6/16/93
Time: 1340

Location: 05 (POL)
Weather: Warm and sunny
Samplers: BJC and LCO

Comments: Meter check = pH 7.0 = 7.03 - OK
Turbidity meter needed slight recalibration.
Odor of creosote @ site.

Field Measurements

HNU/OVA Reading (ppm): 8 (B.G. = Ø)
Water Depth (ft. btoc): 12.77
Product Thickness (ft.): —
Well Volume (gal.): 15.5

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 54.11
Saturated Thickness (ft.): 41.34
3 well volumes (gal.): 46.5

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1310	0	—	—	—	—	Begin purge
1317	10	5	6.71	1250	—	
1320	15	—	—	—	133	
1322	20	3	6.80	1260	122	
1327	30	2.5	6.81	1260	97	
1329	35	2.5	6.81	1260	158	turbidity suddenly up
1332	40	2.5	6.80	1260	86	
1334	45	2.5	6.80	1260	62	
1336	47	2.5	6.82	1240	41	Final Measurements

Alkalinity = 728 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-02
Date: 6/16/93
Time: 1040

Location: 05 (POL)
Weather: Warm and Sunny
Samplers: BJC/LCO

Comments: Meter Check: pH 7.0 = 7.03 OK.
9.6 NTU = 9.9, set to 9.6
.485 NTU = .49, OK.

Field Measurements

HNU/OVA Reading (ppm): Ø (B.G. = Ø)
Water Depth (ft. btoc): 11.56
Product Thickness (ft.): —
Well Volume (gal.): 15.7

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 53.31
Saturated Thickness (ft.): 41.75
3 well volumes (gal.): 47.1

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1011	0	—	—	—	—	Begin purge
1016	10	3	6.44	780	180	
1022	20	2	6.60	720	60	
1025	25	1.5	6.81	720	71	
1028	30	2	6.85	720	40	
1030	35	1.5	6.85	720	36	
1034	40	2	6.83	720	36	
1036	45	2	6.83	720	—	
1039	47	2	6.86	720	37	Final Measurements

Alkalinity = 410 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-03
Date: 6/17/93
Time: ~~8~~ 1910

Location: 05 (POL)
Weather: raining, cool
Samplers: BJC and LCO

Comments: No free product in well. (Used new Keck interface probe)
* OVM reading was only 6 on 6/11/93 when hydrocarbon. Suspect? survey was done. Meter check: pH 7.0 = 7.00 - OK
9.6 NTU = 9.6, 0.485 NTU – slight adjustment.

Field Measurements

HNU/OVA Reading (ppm): *656 (B.G. = ~~8~~)
Water Depth (ft. btoc): 9.92
Product Thickness (ft.):
Well Volume (gal.): 16.4

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 53.69
Saturated Thickness (ft.): 43.77
3 well volumes (gal.): 49.2

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1845	0	–	–	–	–	Begin purge
1850	10	4	6.59	1200	>200	
1854	20	3	6.58	1170	>200	
1856	30	3	6.67	1160	107.2	
1903	40	3	6.78	1170	62	
1906	45	3	6.78	1160	42	
1909	50	3	6.76	1160	44	Final Measurements

alkalinity = 628 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-03-DS
Date: 6/17/93
Time: 1910

Location: 05 (POL)
Weather: Cloudy /cool
Samplers: BX / LCO

Comments: See log for 05-MW-03

Field Measurements

HNU/OVA Reading (ppm): —
Water Depth (ft. btoc): —
Product Thickness (ft.): —
Well Volume (gal.): —

Product Depth (ft. btoc): —
Well Depth (ft. btoc): —
Saturated Thickness (ft.): —
3 well volumes (gal.): —

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
See	sample log	for	05-MW	-03		
1940	52	3	~~6.70~~ 6.74	1090	45	Final Measurements

Alkalinity = 642 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-04
Date: 6/16/93
Time: 1600

Location: 05 (POL)
Weather: warm and sunny, breezy
Samplers: BJC / LCO

Comments: Did not attempt to measure product -- probe isn't working. We will measure it with new probe during hydrocarbon survey.
Meter check 9.6 NTU = 9.66 - OK, 0.85 NTU = needs slight adjustment.
pH 7.0 = 7.03, OK.

Field Measurements

HNU/OVA Reading (ppm): 420 (B.G. = Ø) *
Water Depth (ft. btoc): 8.70
Product Thickness (ft.): –
Well Volume (gal.): 15.2

Product Depth (ft. btoc): –
Well Depth (ft. btoc): 49.18
Saturated Thickness (ft.): 40.48
3 well volumes (gal.): 45.6

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Temp.	pH	Quality Cond	Turbidity	Comments
1530	0	–	–	–	–	Begin purge
1536	10	3.5	6.74	1390	7200	
1540	20	1.5	6.88	1390	95	Read temp wrong?
1544	30	3.0	6.84	1350	181	
1548	40	2.5	6.87	1320	156	Lots of road traffic.
						I think all the ~~petroleum~~ etc hydrocar
						in the water are adversely
						affecting measurements.
						They look pretty good,
						and we will sample
						@ 46 gallons to
						avoid staying in
						this environment
						any longer than
						necessary.
1555	46	2.5	6.93	1350	101	Final Measurements

Alkalinity = 840 mg/L $CaCO_3$

* after beginning to purge, B.Z. went up to 62. Respirators donned.

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-05
Date: 6-17-93
Time: 1130

Location: 05 (POL)
Weather: Cloudy, Cool
Samplers: LCO / BJC

Comments: No working interface probe. We will measure product (if any) when the new probe arrives. ~~#~~ Meter check: pH 7.0 = 7.00 → OK! Turbidity meter needed slight tweaking.

Field Measurements

HNU/OVA Reading (ppm): 263
Water Depth (ft. btoc): 7.49
Product Thickness (ft.): * –
Well Volume (gal.): 16.5

Product Depth (ft. btoc): –
Well Depth (ft. btoc): 51.59
Saturated Thickness (ft.): 44.1
3 well volumes (gal.): 49.5

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1059	0	–	–	–	–	Begin purge
1104	10	2.5	6.68	1250	7200	
1109	20	2.0	6.82	1280	88	
1112	30	2.0	6.94	1250	107	
1115	35	2.0	6.92	1270	90	
1117	40	2.0	6.92	1260	87	
1122	45	1.5	6.92	1260	49	
1127	50	2.0	6.91	1280	33	Final Measurements

Alkalinity = 644 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-06
Date: 6/16/93
Time: 1845

Location: 05 (POL)
Weather: warm and sunny, breezy
Samplers: BJC and LCO

Comments: *OVM lamp out. We will look at it tonight. This well had an OVM reading of Ø during the hydrocarbon survey on 6/11/93
Meter check: pH 7.0 = 6.96 - OK

Field Measurements

HNU/OVA Reading (ppm): * —
Water Depth (ft. btoc): 6.65
Product Thickness (ft.): —
Well Volume (gal.): 16.1

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 49.51
Saturated Thickness (ft.): 42.86
3 well volumes (gal.): 48.3

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1810	0	—	—	—	—	Begin purge
1815	10	*	6.68	0900	62	THERMOMETER NOT WORKING REPLACEMENT ON IT'S WAY.
1825	20	4	6.73	920	37	
1829	30	3.5	6.75	0900	26	
1833	40	4	6.76	890	21	
1837	45	4	6.73	900	12	
1839	48	3	6.75	920	9.8	
1839	48	3	6.75	920	9.8	Final Measurements

Alkalinity = 400 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-01
Date: 6/10/93
Time: 1205

Location: 06 (West Unit - Waste accumulation area)
Weather: warm and sunny
Samplers: BC and LCO

Comments: OVM is acting strange. The well appears to have detectable O.V., ~~but~~ and background and BZ are mostly Ø. However, twice the OVM went up to over 2000 and the alarm came on. There is no odor, though. The OVM did this two days ago and was found to be out of calibration. Will recalibrate.

Field Measurements

HNU/OVA Reading (ppm): 150.6 (BG.=0)
Water Depth (ft. btoc): ~~52.73~~ 14.00
Product Thickness (ft.): —
Well Volume (gal.): 14.5

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 52.73
Saturated Thickness (ft.): 38.73
3 well volumes (gal.): 43.5

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1130	5	7	6.63	1380	-	
1133	10	—	-	Ø	—	too turbid to get a
1136	15	6	6.75	1390	—	reading.
1145	20	6	6.77	1380	—	
1149	25	6	6.75	1380	—	
1151	30	6	6.74	1380	—	
1153	35	6	6.75	1380	—	
1148	40	6	6.75	1380	—	
1200	44	6	6.76	1380	—	
1200	44	6	6.76	1380	—*	Final Measurements

Alkalinity = 830 mg/L $CaCO_3$

* Took a turbidity meter following sampling and got a reading of 175 (200 is max. readable level).

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06 - MW - 01 Resample
Date: 6/15/93
Time: 1150

Location: 06 (West unit - Waste Accumulation Area)
Weather: Cold and raining
Samplers: BJC/LCO

Comments: This well is being resampled due to the late and warm arrival of coolers 6-11-A and 6-11-B. Meter check: pH 7.0 = 6.95 OK
9.6 NTU = 9.99
0.485 NTU = 0.465 } slight recal.

Field Measurements

HNU/OVA Reading (ppm): 119 Bg. = 0*
Water Depth (ft. btoc): 13.45
Product Thickness (ft.): –
Well Volume (gal.): 14.7

Product Depth (ft. btoc): –
Well Depth (ft. btoc): 52.73 (measured 6/10/93)
Saturated Thickness (ft.):
3 well volumes (gal.): 44.1

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1122	0	–	–	–	–	Begin purge
1127	10					
1136	25	6.5	6.63	1370	150	
1140	35	6	6.64	1420	74	
1147	44	6	6.67	1410	82	End purge
1147	44	6	6.67	1410	82	Final Measurements

* OVM reading is mostly 0, but bouncing up every once in a while to 40, 50, 60. Not sure if this is real. It looks like 0 *

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-02
Date: 6/10/93
Time: 1545

Location: 06 (West unit - waste accumulation area)
Weather: Storm approaching, but Sunny and [illegible]
Samplers: LCO/BJC

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0)
Water Depth (ft. btoc): 10.43
Product Thickness (ft.): —
Well Volume (gal.): 15.5
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 51.83
Saturated Thickness (ft.): 41.40
3 well volumes (gal.): 46.5
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1510	0	-	-	-	-	Begin purge
1520	15	6.5	6.52	1300	>200	Too muddy for turb.
15:23	20	5.5	6.57	1320	>200	↓
15:27	25	5	6.62	1320	>200	↓
15:30	30	5	6.63	1320	>200	↓
15:33	35	5	6.65	1330	>200	↓
15:36	40	5	6.66	1320	>200	↓
15:38	45	5	6.66	1320	184.5	
		~~5~~	~~6.65~~		~~193~~	
1540	46.5	5	6.66	1320	188.2	Final Measurements

Alkalinity = 764 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-02 Resample
Date: 6/15/93
Time: 1440

Location: 06 (West unit, waste accumulation are
Weather: Cloudy, Cool
Samplers: BJC and LCO

Comments: Resampling this well -- Original samples misrouted by Fed Ex.
Meter checks. pH 7.00 = 6.97 OK. 9.6 NTU = 9.58 NTU; .485 NTU = .49 NTU } OK.

Field Measurements

HNU/OVA Reading (ppm): 44 (BG. = ∅)
Water Depth (ft. btoc): 10.04
Product Thickness (ft.): —
Well Volume (gal.): 15.7
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 51.83 (measured 6/10/93
Saturated Thickness (ft.): 41.79
3 well volumes (gal.): 47.1
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
~~2~~ 1410 BJC	0	—	—	—	—	Begin purge
1420	20	5	6.54	1350	163	
1428	30	5	6.56	1370	>200	
1434	40	5	6.58	1360	195	
1437	45	4.5	6.60	1360	—	
1439	47	5	6.57	1360	195	
1439	47	5	6.57	~~1380~~ 1360 BJC	195	Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-03
Date: 6/9/93
Time: ~~1853~~ 1935

Location: 06 (West Unit)
Weather: Partly cloudy, cool
Samplers: RJC/LCO

Comments:

Field Measurements

HNU/OVA Reading (ppm): 2.6 (B.G.=0)
Water Depth (ft. btoc): 6.99
Product Thickness (ft.): —
Well Volume (gal.): 15.6

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 48.59
Saturated Thickness (ft.): 41.60
3 well volumes (gal.): 46.8

Purge Method: Waterra

Sample Method: Waterra

		Water	Quality			
Time	Cum. Vol. (gal.)	Temp.	pH	Cond	Turbidity	Comments
1905	0	—	—	—	—	Begin purge
1908	5	6	6.5	1190	99	
1912	15	5	6.68	1170	78	
1915	20	5	6.72	1170	60	
1920	30	5	6.73	1170	67	
1922	35	5	6.72	1160	—	
1925	40	5	6.73	1160	43	
1929	45	5	6.72	1160	26	
1932	47	5.5	6.73	1160	24	
1932	47	5.5	6.73	1160	24	Final Measurements

Alkalinity = 660 mg per liter

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-04
Date: 6/10/93
Time: 1805

Location: 06 (west unit - waste accumulation area)
Weather: warm and sunny, turning to partly cloud and ra
Samplers: BJC/LCO

Comments: *used interface probe but could not detect free product. Sheen on purge drum and distinct odor. Checked pH meter → 7 = 7.0

Field Measurements

HNU/OVA Reading (ppm): 113 (BG=0)
Water Depth (ft. btoc): 5.05
Product Thickness (ft.): —*
Well Volume (gal.): 16.3

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 48.46
Saturated Thickness (ft.): 43.41
3 well volumes (gal.): 48.9

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1730	~~1~~ 0	—	—	—	—	Begin purge
1737	10	7	6.68	1270	36.5	
1740	15	6	6.82	1220	19.3	
1745	20	6	6.84	1220	12.2	
1748	25	5	6.83	1220	—	
1752	33	5	6.85	1210	33	Turbidity suddenly high
1754	38	5	6.84	1210	~~35~~ 9.6	
1758	40	5	6.84	1220	14.4	
1802	45	5	6.85	1210	—	
1804	49	5	6.84	1220	17.2	Final Measurements

Alkalinity = 590 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-04
Date: 6/15/93
Time: 1710

Location: 06 (West Unit -- waste accumulation ar
Weather: cool, partly cloudy
Samplers: BK/LCC

Comments: Resample to replace samples misrouted by Fed Ex.
Meter check pH 7 = 6.96 ok
9.6 NTU = 9.66, 0.485 NTU = 0.486

Field Measurements

HNU/OVA Reading (ppm): 164 (B.G = 0)
Water Depth (ft. btoc): 4.74
Product Thickness (ft.): —
Well Volume (gal.): 16.4

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 48.46 (measured 6/10/93)
Saturated Thickness (ft.): 43.72
3 well volumes (gal.): 49.2

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1635	0	—	—	—	—	Begin purge
1700	40	6	6.75	1230	9.6	
1705	45	6	6.77	1260	12.7	
1709	50	5.5	6.78	1260	9.6	
1709	50	5.5	6.78	1260	9.6	Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-01
Date: 8-10-93
Time: 1615

Location: Campion
Weather: Warm and Sunny
Samplers: BJC/CMS

Comments:
*from last years measurement - casing now broken
Sample ID = 07-MW-01-03

Field Measurements

HNU/OVA Reading (ppm): 0 ppm
Water Depth (ft. btoc): 5.30
Product Thickness (ft.):
Well Volume (gal.): 13

Product Depth (ft. btoc):
Well Depth (ft. btoc): 16.78*
Saturated Thickness (ft.): 11.5
3 well volumes (gal.):

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1525	0	-	-	-	-	begin purge
1528	2	4°C	6.68	1180	148.4	
1534	4	5°C	6.93	1190	138.0	well is going dry intermittently
1545	6	5°C	7.04	1130	115.8	
1550	8	4°C	6.98	1050	51.6	
1555	10	4°C	7.08	1010	36.6	
1605	13	4°C	7.02	1000	29.6	final reading
						allow well to recharge
						prior to sampling.
						Final Measurements

alkalinity = 620 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-02
Date: 6/9/93
Time: 1500

Location: 07 (Campion)
Weather: Warm and sunny, breezy, mo
Samplers: BJC and LCO

Comments: All OVM readings are 0, but it smells like hydrocarbons, and there is a sheen on the groundwater. Meter calibrations were a little off. Recalibrated both meters.

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0 ??)
Water Depth (ft. btoc): 2.90
Product Thickness (ft.): —
Well Volume (gal.): 7.2

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 22.21
Saturated Thickness (ft.): 19.31
3 well volumes (gal.): 21.6

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
14:35	0	—	—	—	—	Begin purge
14:37	3	3.5	7.26	1520		H.C. oder
14:40	5	2.5	7.40	1440	125	
14:42	10	2.0	7.44	1450	~~2~~	
14:43	15	1.0	7.47	1440	111	
14:49	20	1.0	7.48	1430	96	
14:54	22	1.5	7.52	1430	69	
		~~1.5~~	~~7~~	~~1420~~		
1458	25	1.5	7.52	1420	69	Final Measurements

Alkalinity = 730 mg per liter $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-02-DS
Date: 6/9/93
Time: 1500

Location: 07
Weather: warm and sunny breezy
Samplers: BJC and LCO

Comments: See 07-MW-02 Sampling log

Field Measurements

HNU/OVA Reading (ppm): 0 (BG.=0)
Water Depth (ft. btoc): 2.90
Product Thickness (ft.): –
Well Volume (gal.): 7.2

Product Depth (ft. btoc): –
Well Depth (ft. btoc): 22.21
Saturated Thickness (ft.): 19.31
3 well volumes (gal.): 21.6

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
See 07-MW-02 Sampling log.						
1600	35	1.5	7.36	1430	107	Final Measurements - taken following sampl.

Alkalinity = 700 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-03
Date: 8-10-93
Time: 1800

Location: Campion
Weather: Warm and Sunny
Samplers: BJC/CMS

Comments:
Sample id = 07-MW-03-03
*from last years measurement - casing now broken

Field Measurements

HNU/OVA Reading (ppm): 0 ppm
Water Depth (ft. btoc): 4.33
Product Thickness (ft.):
Well Volume (gal.): 14.4
Purge Method: Waterra

Product Depth (ft. btoc):
Well Depth (ft. btoc): 17.06*
Saturated Thickness (ft.): 12.73
3 well volumes (gal.):
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1740	0	-	-	-	-	begin
1745	3	3.5°C	6.88	1360	>200	
1750	6	3°C	6.98	1320	148.8	
1752	10	3°C	7.02	1310	87.2	
1755	15	3°C	7.04	1330	-	
1757	17	-	-	-	132.0	
1800	20	3°C	7.04	1320	96.3	final Reading
					-CMS	SAMPLE @ 1800
					8-10-93	
						Final Measurements

Alkalinity = 790 mg/L CaCO

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-04
Date: 7-29-93
Time: 1050

Location: Campion
Weather: pt. cloudy, cool, 58°
Samplers: LCO

Comments: Sample ID = 07-MW-04-03

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.): —
Well Volume (gal.):
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.): 50
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
0943	0	8°C	5.56	1410	34.0	
1015	20	4°C	7.01	1370	175.5	
1025	30	3°C	7.16	1410	→	too turbid to get reading
1027	35	3°C	7.19	1410	189.9	
1030	40	3°C	7.23	1390		
1035	45	2.5°C	7.23	1390		
1037	50	2.5°C	7.23	1390		
1040						Stop purging
						Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-01
Date: 6/13/93
Time: 1700

Location: 09 (West unit - Million Gallon Hill)
Weather: partly cloudy, cool
Samplers: BJC/LCO

Comments: Check meters - pH 7.0 = 6.99
10 NTU = 9.95
0.5 NTU = 0.51 } OK

Field Measurements

HNU/OVA Reading (ppm): Ø (B.G=Ø)
Water Depth (ft. btoc): 4.34
Product Thickness (ft.): —
Well Volume (gal.): 16.2

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.57
Saturated Thickness (ft.): 43.23
3 well volumes (gal.): 48.6

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1628	0	–	–	—	–	Begin purge
1634	10	5	6.68	1210	>200	abundance of Fe oxides
1636	15	5	6.74	1220	>200	
1639	20	4.5	6.76	1220	189	
1634	25	–	6.76	1210	196	
1647	35	5	6.75	1220	141	
1650	40	5	6.75	1220	120	
1654	45	4.5	6.76	1220	124	
1656	49	5	6.77	1220	136	Final Measurements

Alkalinity = 706 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-02
Date: 6/13/93
Time: 1450

Location: 09 (West Unit – Million Gallon Hill)
Weather: Warm and sunny
Samplers: BJK and LCO

Comments: pH meter check -- 7.0 = 6.95 OK
Turbidimeter -- 10 = 10.14, 0.5 = 0.59
Lots of Fe oxides in this well

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0)
Water Depth (ft. btoc): 2.23
Product Thickness (ft.): —
Well Volume (gal.): 16.0

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 44.92
Saturated Thickness (ft.): 42.69
3 well volumes (gal.): 48.0

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1422	0	-	—	-	—	Begin purge
1424	5	6	6.66	1130	184	
1429	15	5	6.76	1100	118	
1434	20	4.5	6.80	1080	67	
1437	25	4.5	6.79	1060	63	
1440	30	4.5	6.79	1070	68	
1443	35	4.5	6.79	1060	45	
1445	40	4.5	6.80	1060	40	
1447	45	4.0	6.79	1050	38	
1449	48	4.5	6.81	1060	16	
1449	48	4.5	6.81	1060	16.	Final Measurements

Alkalinity = 600 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-03
Date: 6/14/93
Time: 1405

Location: 09 (West Unit - Million Gallon Hill)
Weather: Warm and sunny
Samplers: BJC/LCO

Comments: pH meter check: pH 7.0 = 7.03
turbidity meter: need slight recalibration

Field Measurements

HNU/OVA Reading (ppm): Ø (BG. = 0)
Water Depth (ft. btoc): 5.63
Product Thickness (ft.): —
Well Volume (gal.): ~~BX~~ 15.6

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.33
Saturated Thickness (ft.): 41.70
3 well volumes (gal.): 46.8

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality: Temp.	pH	Cond	Turbidity	Comments
1340	0	-	-	-	-	Begin purge
1345	10	5	6.67	1080	—	
1347	15	-	—	—	95	
1348	20	3	6.70	1100		
1350	25	~~3~~ BX	—	—	~~BX~~ $\boxed{46}$	
1354	30	3	6.69	1090	—	
1356	35	3	6.72	1090	45	
1358	40	3	6.71	1090	41	
1400	45	2.5	6.70	1090		
		~~3~~	~~6.72~~	~~1090~~	BX, see below	
1402	48	3	6.72	1090	65	Final Measurements

Alkalinity = 454 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-04
Date: 6/14/93
Time: 1105

Location: West Unit (Million Gallon Hill)
Weather: Sunny and cool
Samplers: BX/LCO

Comments: Meter check pH 7.00 = 6.99
10 NTU → need slight calibration
0.5 NTU → " " "

Field Measurements

HNU/OVA Reading (ppm): Ø (BG = Ø)
Water Depth (ft. btoc): 7.32
Product Thickness (ft.): —
Well Volume (gal.): 14.8

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.17
Saturated Thickness (ft.): 39.85
3 well volumes (gal.): 44.4

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1035	0	—	—	—	—	Begin purge
1038	5	5	—	—	—	
1040	10	4	6.08	1370	89	
1042	15	3.5	6.68	1190	51	
1046	20	3.5	6.72	1180	47	
1049	25	3.5	6.75	1180	32	
1051	30	3.5	6.74	1180	—	
1055	35	3.5	6.77	1190	21	
1058	40	3.5	6.75	1170	22	
~~1102~~						
1102	45	3.5	6.74	1170	15	Final Measurements

Alkalinity = 624 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-05
Date: 6/14/93
Time: 1745

Location: 09 (West Unit - Million Gallon Hill
Weather: Hot and Sunny
Samplers: BJC/LCO

Comments: Meter check - pH 7.0 = 7.02
turbidity meter is not calibrating well at all. keeps drifting up
ate 10 = 10.17 } will try to fix tonight
.5 = .35

Field Measurements

HNU/OVA Reading (ppm): 4.4 (BG = Ø)
Water Depth (ft. btoc): 3.26
Product Thickness (ft.): —
Well Volume (gal.): 16.4

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.05
Saturated Thickness (ft.): 43.79
3 well volumes (gal.): 49.2

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Temp.	Quality pH	Cond	Turbidity	Comments
1720	0	—	—	—	—	Begin purge
1724	10	5	6.45	990	—	
1728	20	3.5	6.72	990	75	
1733	30	3.5	6.74	990	—	
1735	35	3.5	6.74	990	37	
1738	40	3.0	6.75	990	35	
1740	45	3.0	6.75	980	30	
1743	49	3.0	6.75	980	32	Final Measurements

Alkalinity = 464 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 07-MW-06
Date: 6/14/93
Time: 1545

Location: 07 (West Unit – Million gallon hill)
Weather: Warm and sunny
Samplers: BK / LCO

Comments: Meter check → Turbidity. 10 NTU = 10.08 OK
05 NTU = 0.45 – set to 0.50
pH meter: pH 7.0 = 7.04

Field Measurements

HNU/OVA Reading (ppm): Ø (BG = Ø)
Water Depth (ft. btoc): 2.49
Product Thickness (ft.): —
Well Volume (gal.): 16.6

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 46.80
Saturated Thickness (ft.): 44.31
3 well volumes (gal.): 49.8

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1518	0	—	–	—	—	Begin purge
1522	10	6.5	6.50	350	>200	Conductivity very low
1527	20	4	6.69	350	>200	
1531	30	3	6.84	340	~~180~~	
1532	35	3	6.81	340	180	
1535	40	3	6.72	340	99	
1538	45	3.5	6.72	340	111	? Turbidity up ? Remeasure @ 50g
1540	50	3.0	6.71	340	76	Final Measurements

↳ Remeasured @ 51 gallons = 44

Alkalinity = 132 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10-MW-01 Location: 10
Date: 6-8-93 Weather: Cool and cloudy
Time: 1535 Samplers: BJC/LCO

Comments: Removed transducer @ 2:20
Checked pH meter 7.0 = 7.01. Turbidity meter 10 = 10.33
.5 = .6

Field Measurements

HNU/OVA Reading (ppm): 0 (BG = 0) Product Depth (ft. btoc): —
Water Depth (ft. btoc): 7.21 Well Depth (ft. btoc): 46.63
Product Thickness (ft.): — Saturated Thickness (ft.): 39.42
Well Volume (gal.): 14.8 3 well volumes (gal.): 44.4

Purge Method: Waterra Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1443	5	2° C	6.19	1150	130.1	
1449	10	5° C	6.63	1130	112.0	
1453	15	5°C	6.61	1120	60.8	
1457	20	5°C	6.66	1140	85.2	
1502	25	5°C	6.68	1130	39.1	
1508	30	5°C	6.68	1150	26.2	
1512	35	5°C	6.69	1140	30.0	
1516	40	5°C	6.69	1140	20.2	
1520	43	5°C	6.69	1130	23.3	
1525	45	5°C	6.70	1140	23.8	
1528	47	5°C	6.68	1130	35.4	
1528	47	5	6.68	1130	35.4	Final Measurements

Alkalinity = 630 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10-MW-01
Date: 6/15/93
Time: 1855

Location: 10 (Vehicle Maintenance Building
Weather: warm; partly cloudy
Samplers: BJC/LCO

Comments: Asked to resample well to collect enough water for Nitrate/Nitrite, Anions, and TDS. Meter check: 9.6 NTU = 9.45 (set to .485 NTU = .47 (set to .4 pH 7.0 =

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. = 0)
Water Depth (ft. btoc): 6.37
Product Thickness (ft.): —
Well Volume (gal.): 15.1

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 46.63 (measured 6-8-93)
Saturated Thickness (ft.): 40.26
3 well volumes (gal.): 45.3

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1831	0	—	—	—	—	Begin purge
1840	20	6	6.50	1060	~~200~~ 104	spc: Had turbidimeter set on wrong range
1844	30	4.5	6.58	1130	83	
1850	40	4.5	6.62	1140	55	
		~~4.5~~	~~6.63~~			
1854	45	4.5	6.63	1140	55	Final Measurements

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10-MW-02
Date: 6/18/93
Time: 19

Location: 10
Weather: partly cloudy, cool, breezy
Samplers: BJC/LCO

Comments: Used interface probe, but could not detect free product.* OVM reading very high, but background and breathing zone = 0. Check turbidity meter: 10 = 10.08, 0.5 = 0.59
Check pH meter: #7 = 7.01

Field Measurements

HNU/OVA Reading (ppm): 234 (BG = 0)
Water Depth (ft. btoc): 7.34
Product Thickness (ft.): –
Well Volume (gal.): 15.1

Product Depth (ft. btoc): –
Well Depth (ft. btoc): 47.57
Saturated Thickness (ft.): 40.23
3 well volumes (gal.): 45.3

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
16:40	0	–	–	–	–	Begin purge
16:45	5	5	6.69	1330	11.2	
16:54	15	4	6.79	1320	7.6	
17:00	20	4	6.82	1330	8.3	
17:04	25	4	6.83	1320	7.0	
17:06	30	4	6.84	1320	9.?	really unstable turb.
17:08	35	4	6.82	1320	–	tenths
17:10	40	4	6.83	1330	8.?	still fluctuating alot,
17:14	45	4	6.83	1320		but within a small range (7-8-9
17:14	45	4	6.83	1320	8	Final Measurements

Alkalinity = 780 mg/L $CaCO_3$

* Thin film noticeable in purge drum

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10-MW-03
Date: 6/7/93
Time: 1900

Location: 10
Weather: partly cloudy, getting cooler
Samplers: BJC/LCC

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (B.G. =0)
Water Depth (ft. btoc): 7.89
Product Thickness (ft.): —
Well Volume (gal.): 15.0
Purge Method: ~~Redifl0 2~~ BJC Waterra*

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 47.71
Saturated Thickness (ft.): ~~44.9~~ ~~15.0~~ 39.82
3 well volumes (gal.): 45
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
18:15	0	-	—	-	—	begin purg
18:25	10	4.5	5.48	1030		
18:30	15	—	-	—	108	
18:35	20	3.5	5.0	1030	58	pH meter dropping?
18:40	30	3.5	4.65	1040	39	
18:43	35	3.5	4.8	1040	39	
18:46	40	3.0	4.5	1000	40	
18:50	45	3.0	4.6	990	39	Looks good. ✓'d pH cal.
18:50	45	3.0	4.6	990	39	Final Measurements

Alkalinity = 620 mg/L $CaCO_3$

*Generator leaking gas we decided not to use.

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 12-MW-01
Date: 6/6/93
Time: 1930

Location: 12
Weather: Raining
Samplers: LCO/BJC

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (BG = 0
Water Depth (ft. btoc): 3.78
Product Thickness (ft.): —
Well Volume (gal.): 9.5

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 29.02
Saturated Thickness (ft.): 25.24
3 well volumes (gal.): 28.5

Purge Method: Waterra

Sample Method: Waterra

start 6:45

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
18:55	10	5	5.51	910	7200	Started w/ pump, ran out of gas.
19:00	~~20~~ 15 BJC	5	5.65	890	> 200	
19:05	20	4	6.18	900	198	
19:10	25	4	6.17	900	173	
19:15	30	4	5.56	910	170	*water in pH battery case - use after
			sand dropping fast			
7:25	40	4	6:17*	910	170	Final Measurements

* pH Calibration suddenly way out. 7 = 3.62. Water in battery case ?!?

Alkalinity = 540

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 12MW-02
Date: 6-7-93
Time: 13:50

Location: 12
Weather: Warm and sunny, breezy to gusty
Samplers: LCO / BJC

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0 (BG = 0)
Water Depth (ft. btoc): 1.83
Product Thickness (ft.): —
Well Volume (gal.): 8.9

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 25.66
Saturated Thickness (ft.): 23.83
3 well volumes (gal.): 26.7

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
13:10	0	--	—	—	-	Begin purge
13:20	5	4	5.74	880	160	
13:25	10	4	5.61	860		
13:30	15	4	5.60	800	37	
13:35	20	4	6.[illegible]2	800	17	sudden pH change
13:38	25	5	6.2	810	12	but now looks stable.
13:44	30	4	6.4	810	6	
13:48	31	4	6.5	810	5	Final Measurements

Alkalinity = 490 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 12-MW-02-DS-03
Date: 6-7-93
Time: 13:50

Location: 12
Weather: warm and sunny, windy
Samplers: BJC/LCO

Comments:

Field Measurements

HNU/OVA Reading (ppm): 0
Water Depth (ft. btoc): ~~3.04~~ 1.83
Product Thickness (ft.): —
Well Volume (gal.): ~~5.0~~ 8.9
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): ~~41.71~~ 25.66
Saturated Thickness (ft.): ~~37.82~~ 23.83
3 well volumes (gal.): ~~15~~ 26.7
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
See	purge	log	for	12-	MW-02	
13:48	31	4	6.5	810	5	Final Measurements

Alkalinity = 500 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01-MW-Ø7
Date: 9-15-93
Time:

Location: FTA
Weather: cold & cloudy, light SE wind
Samplers: BJC/MAR

Comments: pH check - 7.00 buffer reads 7.05
Sample @ 15:00

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 22.23
Product Thickness (ft.): —
Well Volume (gal.): 4.6

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 50.23
Saturated Thickness (ft.): 28.00
3 well volumes (gal.): 13.8

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1430	0	—	—	—	—	start purging
1433	2.5	2° C	6.71	1150	—	
1435	5.0	1°C	6.73	1140	—	
1438	7.5	1°	6.71	1150	—	
1441	10	1°	6.71	1150	—	
1445	12.5	1°	6.70	1150	—	
1448	15	1°	6.69	1150	—	
1455	17.5	1°	6.71	1150	—	
1458	20.0	1°	6.67	1140	—	stop purging
1458	20.0	1°	6.67	1140	—	Final Measurements

Alkalinity = 680 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 01-MW-08
Date: 9/15/93
Time: ~~[illegible]~~ 1020

Location: Southeastern-most well @ FTA
Weather: Cool and clearing
Samplers: BJC / MAK

Comments: pH meter check: buffer 7 = 7.01.
ambient blank 1050. Collect sample @ 11:16

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 22.19
Product Thickness (ft.): —
Well Volume (gal.): 3.8

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 45.23
Saturated Thickness (ft.): 23.04
3 well volumes (gal.): 11.4

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Temp.	pH	Quality Cond	Turbidity	Comments
1040	0	—	—	—	—	start purge
1042	2.5	2°C	6.68	1230	—	
1045	5.0	2°	6.75	1230	—	
1048	7.5	1.5°	6.80	1220	—	
1055	10	1°	6.81	1220	—	
1103	12.5	1.5	6.84	1240	—	
1106	15	1°	6.83	1230		
1112	~~20~~ 17.5	1.5	6.88	1230		
1115	20	1.5	6.86	1230		
1115	20	1.5	6.86	1230	—	Final Measurements

alkalinity = 764 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-13
Date: 9-13-93
Time: 1630

Location: ~~Cool cloudy~~ F&C 05
Weather: Cool, Cloudy
Samplers: BJC/MAR

Comments: pH calibration check O.K.

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 17.52
Product Thickness (ft.): —
Well Volume (gal.): 3.3
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 37.75
Saturated Thickness (ft.): 20.23
3 well volumes (gal.): 10
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1645	0	—	—	—	—	Begin purge
1648	2.5	2°C	6.54	1110	—	
1651	5.0	1.5°	6.61	1120	—	
1655	7.5	2°C	6.65	1110	—	
1657	10	2°C	6.61	1100	—	
1700	13	2°C	6.59	1110	—	
1707	15	1.5°C	6.61	1100	—	
1707	15	1.5	6.61	1100	—	Final Measurements

alkalinity 644 mg/L $CaCO_3$ — MAR
alkalinity = 644 mg/L $CaCO_3$ — BJC

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-14
Date: 9-16-93
Time: 1315

Location: N side of runway by Mark Air
Weather: cold & windy (from west)
Samplers: BK/MAR

Comments: pH7 buffer check = 7.04 sample time 1415

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 11.70
Product Thickness (ft.): —
Well Volume (gal.): 3.8
Purge Method: waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 35.26
Saturated Thickness (ft.): 23.56
3 well volumes (gal.): 11.4
Sample Method: waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1345	0	—	—	—	—	begin purge
1348	2.5	2°C	6.61	940	—	
1352	5.0	2°C	6.63	920	—	
1357	7.5	2°C	6.64	930	—	
1402	10	2°	6.63	950	—	
1407	12.5	2°	6.63	920	—	
1412	15.0	2°	6.64	930	—	
1412	15.0	2°	6.64	930	—	Final Measurements

alkalinity = 538 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-14 duplicate
Date: 9/16/93
Time: 1315

Location: 05 (South PA on Tarmac)
Weather: Cold, strong winds from West
Samplers: BJ Coel and MAKoalier

Comments: See purge log for 05-MW-14

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 11.70
Product Thickness (ft.): —
Well Volume (gal.): 3.8

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 35.26
Saturated Thickness (ft.): 23.56
3 well volumes (gal.): 11.4

Purge Method: Waterra
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
						readings taken after pouring VOAs
1438	<16	2°C	6.66	930.		Final Measurements

Alkalinity = 562 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 05-MW-15
Date: 3/15/93
Time: 1710

Location: 05
Weather: Cool and cloudy
Samplers: BJC/MAR

Comments: pH 7 buffer = 7.06
ambient blank 1740. Sample @ 18:00

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 12.92
Product Thickness (ft.): —
Well Volume (gal.): 3.6

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 35.14
Saturated Thickness (ft.): 22.2
3 well volumes (gal.): 10.8

Purge Method: Waterra

Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
~~1723~~ 1721 MAR	0	—	—	—	—	begin purge
1730	~~2.5~~ MAR 3.0	2°C	6.83	900	—	
1742	5.0	1°C	6.85	900	—	
1745	7.5	1°C	6.84	890	—	
1749	10.0	1°C	6.84	890	—	
1753	12.5	1°C	6.84	890	—	
1757	15.0	1°C	6.84	890	—	
1757	15.0	1°C	6.84	890	—	Final Measurements

alkalinity = 506 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06 MW 07　　Location: 06
Date: 9-13-93　　Weather: cool & cloudy
Time: 1400　　Samplers: BJC / MAR

Comments: pH needed slight recalibration.

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 22.60
Product Thickness (ft.): —
Well Volume (gal.): 3.3
Purge Method: watera

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 42.74
Saturated Thickness (ft.): 20.14
3 well volumes (gal.): 10
Sample Method: watera

Time	Cum. Vol. (gal.)	Water Temp.	pH	Quality Cond	Turbidity	Comments
1410	0	—	—	—	—	Begin purge
1415	2.5	4	6.53	1400	—	
1420	5.0	4	6.57	1410	—	
1424	7.5	3.5	6.60	1410	—	
1426	10	4	6.59	1400	—	
1433	15	4	6.56	1400	—	water pretty clear
1433	15	4		6.56 err	1400 err	Final Measurements

alkalinity = 824 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 06-MW-07 Duplicate
Date: 9/13/93
Time: 1400
Location: 06
Weather: Cool, cloudy
Samplers: BJC/MAR

Comments: See 06-MW-07 sampling log for purge info

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc):
Product Thickness (ft.):
Well Volume (gal.):
Product Depth (ft. btoc):
Well Depth (ft. btoc):
Saturated Thickness (ft.):
3 well volumes (gal.):

Purge Method:
Sample Method:

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1437	15	9°C	6.60	1410	—	
1437	15	4	~~6.56~~ 6.60	1410	—	Final Measurements

alkalinity = 852 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 09-MW-15
Date: 9-14-93
Time: 1100

Location: W end of runway
Weather: light rain, cold, windy
Samplers: BJC / MMR

Comments: pH7 buffer 7.07
Sample @ 1140

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 12.01
Product Thickness (ft.): —
Well Volume (gal.): 4.2
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 37.61
Saturated Thickness (ft.): 25.6
3 well volumes (gal.): 12.6
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1100	0	—	—	—	—	begin purge
~~1110~~ 1105	2.5	5°C	6.66	970	—	
1110	5	5°	6.80	970	—	
1115	7.5	5°	6.81	970	—	
1119	10	5°	6.81	970	—	
1123	12.5	4°	6.80	940	—	
1127	15	4.5°	6.82	940	—	
1130	17.5	4°	6.82	950		
1133	20	4°	6.83	950	—	stop purge
1133	20	4°	6.83	950	—	Final Measurements

alkalinity = 550 mg/L $CaCO_3$

GROUNDWATER SAMPLING LOG

Project: Galena AFS RI
Client: AFCEE

Well ID: 10-MW-04
Date: 9/12/93
Time: 1620

Location: 10 (VMB)
Weather: Cloudy & Cool
Samplers: BJC / MAK

Comments: pH 7 buffer = pH 7.08   turbidity meter not working (bad bulb?)

Field Measurements

HNU/OVA Reading (ppm):
Water Depth (ft. btoc): 12.88 ft
Product Thickness (ft.): —
Well Volume (gal.): 3.7
Purge Method: Waterra

Product Depth (ft. btoc): —
Well Depth (ft. btoc): 35.13
Saturated Thickness (ft.): 22.25
3 well volumes (gal.): 11
Sample Method: Waterra

Time	Cum. Vol. (gal.)	Water Quality Temp.	pH	Cond	Turbidity	Comments
1655	2	2°C	6.74	1120	—	
1700	5	2°C	6.79	1120	—	
1705	10	2°C	6.90	1110	—	
1710	15	2°C	6.85	1110	—	
1715	20	2°C	6.85	1110	—	
				µS/cm		
1715	20	MAK ~~20~~ 2°C	6.85	1110	—	Final Measurements

alkalinity = 660 mg/L Ca CO_3

1994 Groundwater Sampling Forms

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-01
Date:
Time:

Location: fire training pit
Weather: Mstly Cldy, 48°F
Samplers: SCH/MCJ

Comments: N. 8270

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 15.75
Product Thickness (ft):
Borehole Volume (gal): 30.70

Product Depth (ft btoc):
Well Depth (ft btoc): 49.87
Saturated Thickness (ft): 34.12
3 Borehole Volumes (gal): 83

Purge/Sample Method: port. utility pump — & waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1447	5	4	6.55	1190	Cloudy Brown
1452	20	4	6.53	1170	Clear, fine Particulate
1458	35	4	6.59	1160	"
1504	50	4	6.65	1180	"
1510	65	4	6.68	1176	"
1515	80	4	6.67	1180	"
1518	85	4	6.63	1170	"

Final Measurements:

Temperature 4 pH 6.63 Conductivity 1170 Alkalinity 611 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-02
Date:
Time:
Comments: No 8270

Location: Fire Training Pit
Weather: Cloudy 43°F
Samplers: SCA, TAC

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 14.51
Product Thickness (ft):
Borehole Volume (gal): 13.41

Product Depth (ft btoc):
Well Depth (ft btoc): 29.41
Saturated Thickness (ft): 14.90
3 Borehole Volumes (gal): 36.20

Purge/Sample Method: purge w/utility pump - sample with waterra

Time (4")	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
5 1405	5	3	6.47	1260	Cloudy Brown
20 1411	20	4	6.46	1260	Slightly Cloudy
30 1416	30	4	6.46	1270	Clear
36 1418	36	3.5	6.45	1270	"

Final Measurements:

Temperature 3.5 pH 6.45 Conductivity 1270 Alkalinity 702 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-05
Date:
Time:

Location: Fire Training Pit
Weather: Cloudy 45°F
Samplers: SLM JRC

Comments: No 8270

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 15.90
Product Thickness (ft):
Borehole Volume (gal): 8.6
Product Depth (ft btoc):
Well Depth (ft btoc): 25.47
Saturated Thickness (ft): 9.57
3 Borehole Volumes (gal): 23.25

Purge/Sample Method: purge w/utility pump - sample w/waterra.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1645	5	4	6.67	940	Cloudy, murky
1650	20	4	6.61	930	"
1653	25	4	6.60	930	Clear

Final Measurements:

Temperature 4 pH 6.60 Conductivity 930 Alkalinity 531 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-06
Date: 9-16-94
Time: 1335
Comments: No 8270

Location: FTAP
Weather: Cloudy 40°F
Samplers: SCH, MAR

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): ~~26.79~~ 16.79
Product Thickness (ft):
Borehole Volume (gal): 9.00

Product Depth (ft btoc):
Well Depth (ft btoc): 26.79
Saturated Thickness (ft): 10.00
3 Borehole Volumes (gal): 24.3

Purge/Sample Method: purge w/utility pump – sample w/Watterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1350	5	3°C	6.31	1300	
1356	10	3	6.40	1280	purged close to dry – let recharge several minutes
~~20~~ 1404	15	3°C	6.56	1300	well purged dry
1415	20	3°C	6.60	1300	
1440	25	3°C	6.64	1300	

Final Measurements:

Temperature 3 pH 6.64 Conductivity 1300 Alkalinity 739 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-07
Date: 9-17-94
Time: 1310

Location: FTPA
Weather: Pt. Sunny, 44°F
Samplers: SCH, MAR

Comments: No 8270

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 19.60
Product Thickness (ft):
Borehole Volume (gal): 24.65

Product Depth (ft btoc):
Well Depth (ft btoc): 46.99
Saturated Thickness (ft): 27.39
3 Borehole Volumes (gal): 66.56

Purge/Sample Method: purge w/utility pump - sample w/ Wattera

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1330	5	3°C	6.45	1170	
1337	20	3°C	6.54	1160	
1345	35	3°C	6.54	1140	
1351	50	3°C	6.55	1140	
1400	69	3°C	6.57	1140	

Final Measurements:

Temperature 3 pH 6.57 Conductivity 1140 Alkalinity 643 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 01-MW-08
Date: 9-16-94
Time: 1540

Location: FTPA
Weather: Cloudy, Drizzle-38°F
Samplers: SEA, MIKE

Comments: No 8270

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 22.92
Product Thickness (ft):
Borehole Volume (gal): 18.48

Product Depth (ft btoc):
Well Depth (ft btoc): 43.46
Saturated Thickness (ft): 20.54
3 Borehole Volumes (gal): 50

Purge/Sample Method: purge w/utility pump - sample w/WaHera

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1514	5	36°F, 3°C	6.50	1180	
1520	20	35.5°F 3°C	6.65	1220	
1530	35	36° 3°C	6.70	1210	
1537	50	36°F 3°C	6.69	1220	

Final Measurements:

Temperature 3 pH 6.69 Conductivity 1220 Alkalinity 720

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 04-MW-02
Date: 9-16-94
Time: 1245

Location: E of Runway S. of Baseball field
Weather: Cloudy Rain 36°F
Samplers: SCA/MAR

Comments: Dry Well

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 17.30
Product Thickness (ft):
Borehole Volume (gal): .54

Product Depth (ft btoc):
Well Depth (ft btoc): 18.04
Saturated Thickness (ft): .64
3 Borehole Volumes (gal): 1.3

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:

Final Measurements:

Temperature ______ pH ______ Conductivity ______ Alkalinity ______

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 04-MW-03
Date: 9-16-94
Time: 16:45

Location: Baseball field S.
Weather: Cloudy 44°F
Samplers: SLH, MAR

Comments: Metals only

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 13.51
Product Thickness (ft):
Borehole Volume (gal): 8.45

Product Depth (ft btoc):
Well Depth (ft btoc): 22.90
Saturated Thickness (ft): 9.39
3 Borehole Volumes (gal): 22.8 gal

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
~~1705~~ 1700	5	3°	6.56	1860	Cloudy/ lite sediment,
	~~10~~	~~3~~			
1705	15	3	6.55	1880	
1710	20	3	6.55	1870	
1712	25	3	6.55	1870	

Final Measurements:

Temperature 3 pH 6.55 Conductivity 1870 Alkalinity 1172

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 04 - MW - 03
Date: 9/28/94
Time: 17:40

Location: 04 (Middle of ambient site)
Weather Cold and Cloudy
Samplers: BJC

Comments: Second sample collection of 9/94 to better define background
pH meter calibrated. pH 7 = 7.02, 4 = 4.04, 10 = 10.04
Conductivity: 1000 = 1000.

Field Measurements:

OVM Reading (ppm): NA (Ambient)
Water Depth (ft btoc): 16.59
Product Thickness (ft): —
Borehole Volume (gal): 5.4

Product Depth (ft btoc): —
Well Depth (ft btoc): 22.64
Saturated Thickness (ft): 6.05
3 Borehole Volumes (gal): 16.2

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg ~~C~~ F)	pH (pH units)	Conductivity (umhos/cm)	Comments:
17:45	0	—	—	—	begin purge
17:52	5	35	6.26	1910	cloudy
18:03	10	34	6.43	1890	
18:14	15	34	6.51	1880	
18:16	16	33.5	6.53	1860	

Final Measurements:

Temperature 33.5° F pH 6.53 Conductivity 1860 Alkalinity NA

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-02
Date: 9-20-94
Time: 1053

Location: NE of Frontier Air - 300'
Weather: Cloudy, 36°F
Samplers: SCH, MAR

Comments: Conduct not zeroing - 360 @ air Calib

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 20.60
Product Thickness (ft):
Borehole Volume (gal): 29.48

Product Depth (ft btoc):
Well Depth (ft btoc): 53.36
Saturated Thickness (ft): 32.76
3 Borehole Volumes (gal): 78.44

Purge/Sample Method: purge w/utility pump. Sample w/Watterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1119	5	35°F=2	6.38	740	red & murky
1125	20	35.5°F=2	6.55	740	clear & colorless
1132	35	35.5°F=2	6.61	750	
1139	50	35°F=2	6.66	730	
1146	65	35°F=2	6.68	740	
1152	80	35°F=2	6.70	~~760~~ 750	

Final Measurements:

Temperature 2 pH 6.70 Conductivity 750 Alkalinity 402 mg/L

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-03
Date: 9-20-94
Time: 1305

Location: 200 ft N. of Frontier Air
Weather: Cloudy 38°F
Samplers: [illegible]

Comments: No free product

Field Measurements:

OVM Reading (ppm): 0.00
Water Depth (ft btoc): 19.10
Product Thickness (ft):
Borehole Volume (gal): 31.16

Product Depth (ft btoc):
Well Depth (ft btoc): 53.79
Saturated Thickness (ft): 34.69
3 Borehole Volumes (gal): 93.48

Purge/Sample Method: purge w/utility pump - sample w/waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1451	5	39°F 3	6.38	1180	dark brown sediment
1457	20	38°F = 3	6.64	1060	
1504	35	38°F = 3	6.70	1100	
1510	50	38°F = 3	6.73	1120	
1516	65	38°F = 3	6.76	1120	
1522	80	38°F = 3	6.75	1120	
1528	95	37°F = 3	6.75	1110	

meter not zeroing - values suspect

Final Measurements:

Temperature 3 pH 6.75 Conductivity 1110 Alkalinity 536 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-04
Date: 9-20-94
Time: 16:35

Location: 500 Ft NW of Galena Air Sta.
Weather: Ptly Cldy, 38°F
Samplers: [illegible], Mike

Comments: Does not appear to be free product - ORS not acting quite right though.

Field Measurements:

OVM Reading (ppm): 24 (high reading)
Water Depth (ft btoc): 16.83
Product Thickness (ft):
Borehole Volume (gal): 29.58

Product Depth (ft btoc):
Well Depth (ft btoc): 49.81
Saturated Thickness (ft): 32.98
3 Borehole Volumes (gal): 88.74

Purge/Sample Method: purge w/ whitby pump - Sample w/ waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1704	5	52°F = 5	6.74	1860	brown; murky; white foam (due to pump difficulty)
1720	20	41°F = 5	6.79	1770	
1725	35	41.5°F = 5	6.78	1710	still a little foamy; maybe it's not the pump
1731	50	41°F = 5	6.77	1730	
1737	65	41°F = 5	6.77	1740	
1744	80	41°F = 5	6.77	1760	
1749	90	41°F = 5	6.78	1790	

Final Measurements:

Temperature 5 pH 6.78 Conductivity 1790 Alkalinity 970

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-05
Date: 9-20-94
Time: 1305

Location: N of Runway
Weather: Cloudy, 38°F
Samplers: SW/MR

Comments: * - added wattera bulb length for ORS msrment (ORS probe won't go past Wattera bulb)
OVM reading in drum = 86 ppm - 140 ppm (varies)

Field Measurements:

OVM Reading (ppm): Cap off of Well.
Water Depth (ft btoc): 16.90
Product Thickness (ft): .06
Borehole Volume (gal): ~~36.02~~ 32.41

Top Product 16.84
Product Depth (ft btoc): 16.90
Well Depth (ft btoc): ~52.92 Approx
Saturated Thickness (ft): 36.02
3 Borehole Volumes (gal): 97.23

Purge/Sample Method: purge w/utility pump - sample w/wattera

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1335	5	34°F = 2	6.67	1820	dark gray sediment
1339	20	35°F = 2	6.61	1600	
1343	35	35°F = 2	6.65	1620	
~~1354~~ 1349 MR	50	35°F = 2	6.66	1620	
1355	65	35°F = 2	6.66	1620	
1401	80	35°F = 2	6.66	1640	
1409	100	35°F = 2	6.66	1610	

Final Measurements:

Temperature 2 pH 6.66 Conductivity 1610 & meter not zeroing: value questionable Alkalinity 770 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: OS-MW-06
Date:
Time:

Location: POL Tank Farm
Weather: Clear, 56°F
Samplers: SCH, TAC

Comments:

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 14.13
Product Thickness (ft):
Borehole Volume (gal): 28.9

Product Depth (ft btoc):
Well Depth (ft btoc): 48.55
Saturated Thickness (ft): 34.42
3 Borehole Volumes (gal): 83.6

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
~~1758~~ 1800	5	4	6.82	1420	Brown/Murky red
1807	20	4	6.71	1240	Clear
1813	35	4	6.70	1190	Clear
1818	50	4	6.76	1140	Clear
1823	65	4	6.74	1120	Clear
1830	80	4	6.71	1050	Clear

Final Measurements:

Temperature 4 pH 6.71 Conductivity 1050 Alkalinity 569 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-07
Date: 9-20-94
Time: 1810

Location: Pump Station - Base
Weather: Cloudy, 36°F
Samplers: SCH, MAR

Comments: No Cap on well = OVM = 0.0.

Field Measurements:

OVM Reading (ppm): 0.00
Water Depth (ft btoc): ~~16.87~~ 16.69
Product Thickness (ft):
Borehole Volume (gal): 10.5

Product Depth (ft btoc):
Well Depth (ft btoc): ~~28.58~~ 28.38
Saturated Thickness (ft): 11.69
3 Borehole Volumes (gal): 31.5

Purge/Sample Method: purge w/utility pump. - sample w/waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1836	5	39°F = 3	6.22	1470	thin layer of product?
1839	10	38°F = 3	6.45	1280	
1841	15	38°F = 3	6.51	1240	
1843	20	38°F = 3	6.53	1210	
1845	25	38°F = 3	6.55	1190	
1848	30	38°F = 3	6.55	1180	
1851	35	38°F = 3	6.57	1170	

Final Measurements:

Temperature 3 pH 6.57 Conductivity 1170 Alkalinity

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-11
Date: 9/19/94
Time: 15:25

Location: West POL, near dorm
Weather: Sunny, breezy, cool
Samplers: BJC, SCH

Comments: Well casing has been broken on this well for a long time, No cap.

Field Measurements:

OVM Reading (ppm): Ø
Water Depth (ft btoc): 19.78
Product Thickness (ft):
Borehole Volume (gal): 7.29

Product Depth (ft btoc):
Well Depth (ft btoc): 27.88
Saturated Thickness (ft): 8.10
3 Borehole Volumes (gal): 19.68

Purge/Sample Method: purge w/utility pump - Sample w/waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
3:35	5	37	6.45	1860	Water looks soapy
3:37	10	36	6.47	1830	
3:40	15	36	6.51	1790	
3:42	20	36	6.55	1820	
3:43	25	36	~~6.55~~ 6.57	1810	

Final Measurements:

Temperature 2.5 pH 6.57 Conductivity 1810 Alkalinity 969 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 0S-MW-13
Date: 9-13-94
Time: 1300

Location: East of Execom 200 Feet
Weather: Mst. Cloudy 42°F
Samplers: SCA, MC

Comments:

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 16.44
Product Thickness (ft):
Borehole Volume (gal): 18.95

Product Depth (ft btoc):
Well Depth (ft btoc): 37.50
Saturated Thickness (ft): 21.06
3 Borehole Volumes (gal): 51.15 gallons

Purge/Sample Method: purge w/utility pump — sample w/Wattera.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1305	5	4	6.29	1160	mostly clear
	20	4	6.45	1160	" "
	35	4	6.46	1156	" "
	55	4	6.36	1160	" "

Final Measurements:

Temperature 4 pH 6.36 Conductivity 1160 Alkalinity 608 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-14
Date: 09-19-94
Time: 1330

Location: TAR MAT, Runway area
Weather: Cloudy, 38°F
Samplers: SCM BJC

Comments: pH meter check 7 = 7.03
conductivity needed tweaking: 1300 set to 1000.

Field Measurements:

OVM Reading (ppm): not functioning
Water Depth (ft btoc): 13.48
Product Thickness (ft): —
Borehole Volume (gal): ~~21.5~~ 19.4

Product Depth (ft btoc): —
Well Depth (ft btoc): 35
Saturated Thickness (ft): 21.5
3 Borehole Volumes (gal): 58

Purge/Sample Method: purge w/utility pump - sample w/watterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1349	15	3	6.45	910	Clear
1352	25	3	6.52	900	"
1355	35	3	6.52	860	"
1400	45	3	6.54	770	"
1402	58	3	6.55	800	"

Final Measurements:

Temperature 3 pH 6.55 Conductivity 800 Alkalinity 524

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 05-MW-15
Date: 9/19/94
Sample Time: ~~10:50~~ ~~12:00~~ 1050

Location: POL
Weather: Cold, sunny, wind from East
Samplers: BJC, S

Comments: Well has been graded over flush cover very difficult to remove. Some bentonite in the well. Remove and replace Waterra tubing

Field Measurements:

OVM Reading (ppm): not functioning
Water Depth (ft btoc): 14.75
Product Thickness (ft): –
Borehole Volume (gal): 18.5

Product Depth (ft btoc): –
Well Depth (ft btoc): 35.35
Saturated Thickness (ft): 20.6
3 Borehole Volumes (gal): 55.5

Purge/Sample Method: purge

Time	Cum. Vol. (gal)	Temp. (deg F)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1130	10	33	6.25	1030	
1135	25	33	6.52	0940	
1137	35	33	6.63	~~0940~~ 840	
1140	45	34	6.65	0830	
1144	55	34	6.65	850	
1150	62	34	6.66		Cond. malfunction!! use last.

Final Measurements:

Temperature 34 pH 6.66 Conductivity 850 Alkalinity 507 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-01
Date: 9-17-94
Time: 1650

Location: 06
Weather: Cloudy - 44°F
Samplers: [illegible]

Comments:

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 21.41
Product Thickness (ft):
Borehole Volume (gal): 25.17

Product Depth (ft btoc):
Well Depth (ft btoc): 52.71
Saturated Thickness (ft): 31.30
3 Borehole Volumes (gal): 76.0

Purge/Sample Method: purge w/utility pump - Sample w/Watera.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
~~1500~~ 1700	5	44.5°F=6.5	6.53	1380	red & murky
1707	20	44°F=6.5	6.57	1380	clearer
1715	35	44°F=6.5	6.59	1390	clear & colorless
1722	50	44°F=6.5	6.61	1390	" except when Watera is
1729	65	44°F=6.5	6.61	1390	moved, then very murky
1736	78	44°F=6.5	6.62	1390	clear

Final Measurements:

Temperature 6.5 pH 6.62 Conductivity 1390 Alkalinity 792 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-02
Date: Sept 12, 1994
Time: 1605

Location: E. of Missile Storage
Weather: Clear, 58°F
Samplers: SCA, TAC

Comments:

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 17.43
Product Thickness (ft):
Borehole Volume (gal): 30.79

Product Depth (ft btoc):
Well Depth (ft btoc): 51.65
Saturated Thickness (ft): 34.22
3 Borehole Volumes (gal): 83.15

Purge/Sample Method: purge w/utility pump - Sample w/waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1617	5	6	6.39	1670	Brown/Red/sandy water
1624	20	4	6.48	1840	Clear, little sand
1629	35	4	6.50	1870	Clear, little sand
1637	50	4	6.50	1900	Clear, " "
1644	65	4	6.50	1910	Clear, " "
1650	80	4	6.48	1910	", " "
1652	83	4	6.52	1910	", " "

Final Measurements:

Temperature 4 pH 6.50 Conductivity 1910 Alkalinity 651 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-03
Date: 9 Sept 94
Time: 1444

Location: W. A A
Weather: Cloudy - 37°C
Samplers: TAC SCH

Comments:

Field Measurements:

OVM Reading (ppm): —
Water Depth (ft btoc): 13.90
Product Thickness (ft): —
Borehole Volume (gal):

Product Depth (ft btoc): —
Well Depth (ft btoc): 48.36
Saturated Thickness (ft): ~~[illegible]~~ 34.46
3 Borehole Volumes (gal): 93.04

Purge/Sample Method: Waterra pump.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1506	20	41°F	6.55	1050	Fluid is lite ~~red~~ red/pinkish.
1530	45	42°F	6.89	840	Slightly more clear.
1622	75	42°F	6.89	870	fairly Clear.
1705	96	43°F	6.80	840	

Final Measurements:

Temperature 4°C pH 6.80 Conductivity 840 umhos/cm Alkalinity 646 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-04
Date: 9-17-94
Time: 1045

Location: Million Gallon Hill
Weather: Cloudy, 35°F
Samplers: Sur, MMM

Comments:

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 13.62
Product Thickness (ft):
Borehole Volume (gal): 31.41

Product Depth (ft btoc):
Well Depth (ft btoc): 48.52
Saturated Thickness (ft): 34.90
3 Borehole Volumes (gal): 85.0

Purge/Sample Method: purge w/ whitely pump - sample w/ waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1054	5	42°F = 5.5	6.19	1020	some silt, cleared up
1100	25	42°F =	6.54	1120	
1107	45	42°F =	6.61	1140	
1114	70	42°F =	6.63	1140	
1120	85	42°F =	6.62	1140	

Final Measurements:

Temperature 5.5 pH 6.62 Conductivity 1140 Alkalinity 643 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-05
Date:
Time:

Location: NE Missile Storage
Weather: Clear, 48°F
Samplers: SH, MAC

Comments: Sample well not developed @ all, Very sandy.

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 13.76
Product Thickness (ft):
Borehole Volume (gal): 3.77

Product Depth (ft btoc):
Well Depth (ft btoc): 17.95
Saturated Thickness (ft): 4.19
3 Borehole Volumes (gal): 10g

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1312	1	4	6.58	.740	Very sandy
1327	4	4	6.68	750	" "
1331	7	4	6.72	710	" "
1335	10	4	6.73	710	" "

Final Measurements:

Temperature 4   pH 6.73   Conductivity 710 ~~mg/L CaCO3~~   Alkalinity 483 mg/L CaCO3

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-06
Date: 9-12-94
Time: 1435

Location: Waste Accumilation area
Weather: Clear, 50°F
Samplers: SCH; MR

Comments:

Field Measurements:

OVM Reading (ppm): ?
Water Depth (ft btoc): 18.25
Product Thickness (ft):
Borehole Volume (gal): 10.4

Product Depth (ft btoc):
Well Depth (ft btoc): 29.80
Saturated Thickness (ft): 11.55
3 Borehole Volumes (gal): 28.06

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1445	5	5	6.41	* 1840	Murky Grey, very sandy
1449	15	5	6.49	* 1900	Clear.
1456	20	5	6.47	* 2020	Clear
1502	28	5	6.47	* 2050	Clear.
1505	35	5	6.49	* 2050	Clear.

* New Battery in pH/Cond. meter, will recalibrate after purging in lab.

Final Measurements:

Temperature 5 pH 6.49 Conductivity *2050 Alkalinity 784 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 06-MW-07
Date: 9-16-94
Time: 1030

Location: NE of Radar Tower
Weather: Cloudy, 38°F
Samplers: SCH, MAR

Comments: TOC= 151.40

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 21.76
Product Thickness (ft):
Borehole Volume (gal): 18.9

Product Depth (ft btoc):
Well Depth (ft btoc): 42.75
Saturated Thickness (ft): 20.99
3 Borehole Volumes (gal): 51.0L

Purge/Sample Method: purge w/utility pump - Sample w/Waterra.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1055	5	5	6.15 ? MAR	1400	recalibrated pH meter before measurement - 6.8→7.0
1101	20	41°F / 5	6.52	1400	
1105	35	40.5°F / 5	6.56	1400	
1106	50	40°F / 4.5	6.61	1400	
1120	56	40°F / 4.5	6.61	1390	

Final Measurements:

Temperature 4.5 pH 6.61 Conductivity 1390 Alkalinity 782 mg/L CaCO₃

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 04-MW-01
Date:
Time:

Location: NW of Alert Cell
Weather: Clear 60°F
Samplers: SCH, TAC

Comments: TOC = 142.55

Field Measurements:

OVM Reading (ppm): 0.0 ppm
Water Depth (ft btoc): 12.51
Product Thickness (ft):
Borehole Volume (gal): ~~34.85~~ 31.35

Product Depth (ft btoc):
Well Depth (ft btoc): 47.34
Saturated Thickness (ft): 34.85
3 Borehole Volumes (gal): 85 gal

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1535	5	5	6.75	1130	murky brown
1541	25	4	6.75	1200	lite brown, cloudy
1551	50	4.5	6.77	1250	Clear.
1556	70	4	6.77	1260	Clear
1602	85	4.5	6.77	1270	Clear

Final Measurements:

Temperature 4.5 pH 6.77 Conductivity 1270 Alkalinity 701 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-02
Date:
Time:

Location: Million gallon hill
Weather: Pt. Cloudy, 36°F
Samplers: SCH, TAC

Comments: TOC = 140.52

Sample @ 1005

Field Measurements:

OVM Reading (ppm): 0.0 ppm
Water Depth (ft btoc): 10.72
Product Thickness (ft):
Borehole Volume (gal): 30.77

Product Depth (ft btoc):
Well Depth (ft btoc): 44.91
Saturated Thickness (ft): 34.19
3 Borehole Volumes (gal): 83.08

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:	
0930	5	4	6.54	960	redish-Brown	Sample
0936	25	4.4	6.70	960	Clear	"
0941	40	4.4	6.68	960	Clear	"
0949	65	4	6.76	940	Clear	"
1000	83	4	6.69	930	Clear	"

Final Measurements:

Temperature 4 pH 6.69 Conductivity 930 Alkalinity 536 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-03
Date:
Time:

Location: Million gallon Hill
Weather: Cloudy, 39°F
Samplers: SCA, JTAC

Comments: TOC = 143.78 Sample at 12:50
Initially very red/dark pink color — Fe+

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 13.47
Product Thickness (ft):
Borehole Volume (gal): 29.8

Product Depth (ft btoc):
Well Depth (ft btoc): 46.59
Saturated Thickness (ft): 33.12
3 Borehole Volumes (gal): 89.4

Purge/Sample Method: Purge w/port. utility pump — Sample w/ Waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
12:15	10g	3.3	6.78	950	slite murky Brown
12:20	25g	3	6.79	990	Clear
12:28	40	3	6.76	1000	Clear
12:34	65	3	6.80	1000	Clear
12:39	80	3	6.76	1000	Clear
12:45	89	3	6.79	1000	"

Final Measurements:

Temperature 3 pH 6.79 Conductivity 1000 Alkalinity 438 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-04
Date: 8 Sept 94
Time: 12:00 Start.

Location: South MGH
Weather: Cool overcast ~ 45°
Samplers: TAC SCH

Comments: no waterproof cap on well, made of PVC.

Field Measurements:

OVM Reading (ppm): NA
Water Depth (ft btoc): 15.02
Product Thickness (ft): —
Borehole Volume (gal): 29 gal

Product Depth (ft btoc): —
Well Depth (ft btoc): 47.04
Saturated Thickness (ft): 32.02
3 Borehole Volumes (gal): 86.45

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
13:00	25	39°F =	6.79	1230	murky → clear
13:14	38	39°F =	6.82	900	" "
13:28	55	39°F =	6.98	940	" "
13:48	75	39°F =	6.92	870	" → H clear
14:05	86	39°F	7.04	840	Clear

Final Measurements:

Temperature 4°C pH 7.86 Conductivity 840 Alkalinity 623 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-05
Date:
Time:

Location: Million Gallon Hill
Weather: Cloudy, 39°F
Samplers: SCH / TAC

Comments: TOC = 141.34 Sample well @ 18:30
Initially fairly red, Clearing @ ≈ 10 gallons.
Generator broke at 15:15 spent 2hrs/45 minutes repairing - finished well -

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 10.48
Product Thickness (ft):
Borehole Volume (gal): 32

Product Depth (ft btoc):
Well Depth (ft btoc): 46.78
Saturated Thickness (ft): 35.8
3 Borehole Volumes (gal): 89

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1455	5	3	6.88	840	Clear, lt. brown coarse sediment
1503	30	2.5	6.81	850	" " " " "
1511	45	3	6.79	850	Clear +sed
1800	70	4	6.88	690	Clear
1815	89	3	6.84	690	Clear

Final Measurements:

Temperature 3° pH 6.84 Conductivity 690 Alkalinity 443 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-06
Date: 9-16-94
Time: Start 11:00

Location:
Weather: Cloudy 36°F
Samplers: JCH, MC

Comments: TOC = 140.41
Sample @ 11:30
Sample mostly Clear entire time

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 9.80
Product Thickness (ft):
Borehole Volume (gal): 33

Product Depth (ft btoc):
Well Depth (ft btoc): 46.52
Saturated Thickness (ft): 36.72
3 Borehole Volumes (gal): 99.14

Purge/Sample Method: ~~Sample~~ Purge w/utility port pump – Sample w/Wattera pump

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
11:00	25 gal	3.3	6.98	400	Clear Sample
11:10	40 gal	3.0	6.78	376	Clear Sample
11:15	65 gal	3.0	6.89	366	" "
11:20	85 gal	3.0	6.75	360	" "
11:25	99 gal	3.0	6.79	352	" "

Final Measurements:

Temperature 3.0°C   pH 6.79   Conductivity 352   Alkalinity 189 mg/L CaCO3

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GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-08
Date: 9-18-94
Time: 1315

Location: Million gallon hill
Weather: partly cloudy
Samplers: SCM, MAD

Comments:

Field Measurements:

product top depth. 21.35

OVM Reading (ppm): 2.0 ppm
Water Depth (ft btoc): 21.36
Product Thickness (ft): .39
Borehole Volume (gal): 6.6

Product Depth (ft btoc): 21.74 bottom
Well Depth (ft btoc): 28.71
Saturated Thickness (ft): 7.35
3 Borehole Volumes (gal): 17.82

Purge/Sample Method: purge w/utility pump - Sample w/waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1321	5	42°F 5.5	6.46	1220	slight sheen on top
1325	10	42°F 5.5	6.46	1260	
1328	15	42°F 5.5	6.46	1270	
1330	18	42°F 5.5	6.46	1280	

Final Measurements:

Temperature 5.5 pH 6.46 Conductivity 1280 Alkalinity 739 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-12
Date: 9-18-94
Time: 0930

Location: West of Missle Storage
Weather: Cloudy, 36°F
Samplers: SCB / MHE

Comments: OVM in headspace = 8 ppm, cap had been off of well, though. Sample very oily

Field Measurements:

product Top msement = 12.21

OVM Reading (ppm): 8 ppm
Water Depth (ft btoc): ~~12.21~~ 13.21
Product Thickness (ft): 1.00
Borehole Volume (gal): 7.5

Product Depth (ft btoc): 13.21 — Bottom
Well Depth (ft btoc): 21.63
Saturated Thickness (ft): 8.42
3 Borehole Volumes (gal): 20.46

Purge/Sample Method: Purge w/ utility pump — Sample w/ waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
0950	5	42°F = 5.5	6.32	1310	
0952	10 ~~20~~ MR	42 = 5.5	6.34	1410	
0953	15	42 = 5.5	6.40	1440	
0954	20	42 = 5.5	6.44	1460	

Final Measurements:

Temperature 5.5 pH 6.44 Conductivity 1460 Alkalinity 850 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 09-MW-15
Date:
Time:

Location: SW of Alert Cell
Weather: Ptly. Cloudy 39°F
Samplers: SCH, TACL

Comments: TOC = 142.62

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 13.05
Product Thickness (ft):
Borehole Volume (gal): 21.88

Product Depth (ft btoc):
Well Depth (ft btoc): 37.37
Saturated Thickness (ft): 24.32
3 Borehole Volumes (gal): 59.09

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1026	5	4.5	6.90	740	Brown sample
1033	25	4	6.84	730	Clear
1038	45	4	6.81	730	Clear
1038	70	4	6.80	720	Clear

Final Measurements:

Temperature 4 pH 6.80 Conductivity 720 Alkalinity 401 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 10-MW-01
Date: 9-17-94
Time: 1504
Comments: TOC = 144.39

Location: JP4 Fillstands
Weather: Pt. Cloudy, 44°F
Samplers: SLH, MCWZ

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc): 15.23
Product Thickness (ft):
Borehole Volume (gal): 28.2

Product Depth (ft btoc):
Well Depth (ft btoc): 46.58
Saturated Thickness (ft): 31.35
3 Borehole Volumes (gal): 76.14

Purge/Sample Method: purge w/ utility pump - sample w/ Waterra.

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1528	5	43°F = 6	6.43	1380	very rusty
1533	20	42.5°F = 6	6.49	1250	clear
1539	35	42°F = 5.5	6.51	1240	
1544	50	42°F = 5.5	6.52	1230	
1549	65	41.5°F = 5.5	6.51	1230	
1600	77	42° = 5.5	6.52	1220	

Final Measurements:

Temperature 5.5 pH 6.52 Conductivity 1220 Alkalinity 632 mg/L $CaCO_3$

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 1C-MW-03
Date:
Time:

Location: JP4 Fillstands
Weather: Clear, 60°F
Samplers: SCH, TAC

Comments: TOC = 145.00

Field Measurements:

OVM Reading (ppm): 0.0 ppm
Water Depth (ft btoc): 14.94
Product Thickness (ft):
Borehole Volume (gal): 29.77

Product Depth (ft btoc):
Well Depth (ft btoc): 47.47
Saturated Thickness (ft): 32.53
3 Borehole Volumes (gal): 79.0

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1645	5	4	6.81	1140	Brown Murky
1655	20	4	6.78	1130	Clear,
1658	35	4	6.79	1140	Clear
1703	50	4	6.78	1140	Clear
~~1718~~	~~80~~				
1709	65	4	6.79	1150	Clear
1718	80	4	6.78	1140	Clear

Final Measurements:

Temperature 4 pH 6.78 Conductivity 1140 Alkalinity 608

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 10-MW-04
Date:
Time:

Location: JP4 Fillstands
Weather
Samplers:

Comments: TOC = 143.05 Well not sampled due to damage from snow removal equipment

Field Measurements:

OVM Reading (ppm):
Water Depth (ft btoc):
Product Thickness (ft):
Borehole Volume (gal):

Product Depth (ft btoc):
Well Depth (ft btoc):
Saturated Thickness (ft):
3 Borehole Volumes (gal):

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:

Final Measurements:

Temperature ______ pH ______ Conductivity ______ Alkalinity ______

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 13-MW-037
Date: 9/17/94
Time: 1700

Location: Control Tower Drum Storage
Weather: partly cloudy, breezy, cool
Samplers: B/C/SCH

Comments: pH 7.0 buffer reads 7.04
1000 conductivity buffer reads 1000

Field Measurements:

OVM Reading (ppm): 0
Water Depth (ft btoc): 18.85
Product Thickness (ft): —
Borehole Volume (gal): 8.55

Product Depth (ft btoc): —
Well Depth (ft btoc): 28.33
Saturated Thickness (ft):
3 Borehole Volumes (gal): 25.65

Purge/Sample Method: purge with utility pump, sample w/ waterra

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1720	10	3	6.23	920	Murky w/sand
1724	20	3	6.55	950	Clear
1727	30	3	6.59	940	"

Final Measurements:

Temperature 3 pH 6.59 Conductivity 940 Alkalinity 508

GROUNDWATER QUALITY SAMPLING LOG

Project: Galena Airport RI/FS
Client: AFCEE

Well ID: 13-MW-03B
Date: 9/19/94
Time: 18:55

Location: Control Tower Drum Storage
Weather: partly cloudy, sprinkling, cool
Samplers: BK, SCH

Comments: pH 7 = 6.99
cond 1000 = 1000
Casing of well is heaved. Water in security casing, not in well

Field Measurements:

OVM Reading (ppm): Ø
Water Depth (ft btoc): 17.94
Product Thickness (ft): —
Borehole Volume (gal): 8.9

Product Depth (ft btoc): —
Well Depth (ft btoc): 27.80
Saturated Thickness (ft): 9.86
3 Borehole Volumes (gal): 26.7

Purge/Sample Method:

Time	Cum. Vol. (gal)	Temp. (deg C)	pH (pH units)	Conductivity (umhos/cm)	Comments:
1910	10	3.4	6.33	1040	Clear
1912	15	3.5	6.40	1050	"
1913	20	3.5	6.44	1050	"
1914	25	3.5	6.46	1040	"

Final Measurements:

Temperature 3.5 pH 6.46 Conductivity 1040 Alkalinity 575

Water Level Survey Results

GALENA, ALASKA

Monitoring Well Water Level Data

1993 Survey Data

Well I.D.	Northing	Easting	Elevation To TOC	4-JULY-92 H20 Depth (From TOC)	4-JULY-92 Total Depth (From TOC)	4-JULY-92 Water Elevation	29-JULY-92 H20 Depth (From TOC)	29-JULY-92 Total Depth (From TOC)	29-JULY-92 Water Elevation	15-AUG-93 H20 Depth (From TOC)	15-AUG-93 Total Depth (From TOC)	15-AUG-93 Water Elevation
01-MW-01	3925415.79	1811197.63	145.98							15.16		130.82
01-MW-02	3925631.78	1811354.63	145.50							14.82		130.68
01-MW-03	3925745.10	1811323.05	147.29	7.91	28.36	139.38	11.23	28.26	136.06	16.43		130.86
01-MW-04	3925634.72	1811183.64	144.79	5.75	22.68	139.04	8.67	22.66	136.12	13.92		130.87
01-MW-05	3925523.35	1811148.49	146.57	8.05	25.96	138.52	10.60	25.90	135.97	15.75		130.82
01-MW-06	3925450.64	1811349.18	147.27	7.86	26.81	139.41	11.28	26.81	135.99	16.20		131.07
01-MW-07	3925231.05	1811068.65	143.19							23.39		119.80
01-MW-08	3925198.04	1811266.41	153.49							22.07		131.42
04-MW-02	3925268.76	1812283.24	147.20							17.01		130.19
04-MW-03	3925460.08	1812401.51	145.55							14.49		131.06
05-MW-01	3926266.22	1804905.55	150.64							20.96	53.88	129.68
05-MW-02	3925967.52	1805428.72	149.51							19.85	53.48	129.66
05-MW-03	3926037.36	1805183.76	147.93									
05-MW-04	3926029.31	1805029.33	145.82							16.21	49.20	129.61
05-MW-05	3925969.98	1804904.41	145.57							16.09		129.48
05-MW-06	3926176.70	1804528.75	144.71							15.08	49.66	129.63
05-MW-07	3926111.00	1804843.18	145.91	6.78	28.37	139.13						
05-MW-08	3926573.32	1804993.75	145.73	6.52	28.90	139.21						
05-MW-09	3926898.84	1804765.31	147.31	8.20	28.63	139.11				17.38	28.63	129.93
05-MW-10	3926151.95	1805152.54	147.90	12.66	30.09	135.24				18.76	30.09	129.14
05-MW-11	3926508.77	1804453.98	149.13	10.25	23.18	138.88						
05-MW-12	3926157.70	1804305.71	147.16	8.60	25.03	138.56						
05-MW-13	3926306.86	1804190.23	147.01									
05-MW-14	3925586.00	1805078.00	142.05									
05-MW-15	3925725.23	1804486.96	143.34									
06-MW-01	3926640.00	1803588.76	151.30							21.70	52.41	129.60
06-MW-02	3926438.83	1803544.45	147.91							18.40	52.64	129.51
06-MW-03	3926136.57	1803300.78	144.59				16.28	48.70	128.31	15.24	48.36	129.35
06-MW-04	3926311.90	1803047.49	142.70							13.36	48.43	129.34
06-MW-05	3926368.72	1803214.00	144.14	5.16	18.01	138.98						
06-MW-06	3926311.42	1803740.11	148.92	9.93	30.01	138.99						
06-MW-07	3927008.19	1803826.28	151.90									
09-MW-01	3925887.18	1802988.49	142.55							13.31	48.45	129.24
09-MW-02	3925561.03	1802813.90	140.52							11.41	44.93	129.11
09-MW-03	3926365.99	1802303.17	143.78							14.54		129.24
09-MW-04	3926072.77	1802387.37	145.52							16.33		129.19
09-MW-05	3926630.27	1802495.32	141.34							11.99		129.35
09-MW-06	3926844.91	1802850.48	140.41							10.94		129.47
09-MW-07	3927135.32	1803116.58	143.67	4.94	23.71	138.73						
09-MW-08	3926230.77	1802612.25	150.21	15.66	28.65	134.55				21.91		128.30
09-MW-10	3926424.14	1802644.80	166.07									
09-MW-11	3926573.80	1802774.34	163.25									
09-MW-12	3926198.21	1802958.84	141.23	2.49	21.70	138.74				12.85		128.38
09-MW-14	3925903.33	1802573.13	146.92							17.74		129.18
09-MW-15	3925290.16	1802754.76	142.62									
10-MW-01	3926165.16	1803467.19	144.39				9.84	46.70	134.55	14.99		129.40
10-MW-02	3925989.13	1803620.63	144.62				10.61	47.79	134.01	15.26		129.36
10-MW-03	3925916.26	1803383.92	145.00				10.18	47.64	134.82	15.69	47.64	129.31
10-MW-04	3925545.84	1803251.22	143.05									
11-MW-01	No survey data for this well			2.55	18.39	-2.55				11.85	18.39	-11.85
11-MW-02	3926502.02	1803274.10	143.82	5.03	21.26	138.79						
12-MW-01	3924457.46	1804255.74	141.26									
12-MW-02	3924455.73	1804963.34	139.46							10.30		129.16

GALENA, ALASKA
Monitoring Well Water Level Data
1993 Survey Data

Well I.D.	Northing	Easting	Elevation To TOC	18-AUG-93 H20 Depth (From TOC)	18-AUG-93 Total Depth (From TOC)	18-AUG-93 Water Elevation	1-JULY-93 H20 Depth (From TOC)	1-JULY-93 Total Depth (From TOC)	1-JULY-93 Water Elevation	13-SEPT-93 H20 Depth (From TOC)	13-SEPT-93 Total Depth (From TOC)	13-SEPT-93 Water Elevation
01-MW-01	3925415.79	1811197.63	145.98							16.73	49.94	129.25
01-MW-02	3925631.78	1811354.63	145.50							15.29	29.52	130.21
01-MW-03	3925745.10	1811323.05	147.29							16.86	28.00	130.43
01-MW-04	3925634.72	1811183.64	144.79							14.58	22.39	130.21
01-MW-05	3925523.35	1811148.49	146.57							16.58	25.68	129.99
01-MW-06	3925450.64	1811349.18	147.27							16.41	26.81	130.86
01-MW-07	3925231.05	1811068.65	143.19									
01-MW-08	3925198.04	1811266.41	153.49									
04-MW-02	3925268.76	1812283.24	147.20				10.38	22.63	136.82	17.80	18.07	129.40
04-MW-03	3925460.08	1812401.51	145.55				12.81	17.77	132.74	13.84	22.72	131.71
05-MW-01	3926266.22	1804905.55	150.64	20.96	53.88	129.68	17.47	53.82	133.17	21.73	53.88	128.91
05-MW-02	3925967.52	1805428.72	149.51	19.84	53.48	129.66	16.35	53.12	133.16	20.78	53.48	128.73
05-MW-03	3926037.36	1805183.76	147.93	18.25		129.68	13.81	53.67	134.12	19.21	53.73	128.72
05-MW-04	3926029.31	1805029.33	145.82	16.25	49.20	129.57				17.72	49.20	128.10
05-MW-05	3925969.98	1804904.41	145.57							18.28	50.70	127.29
05-MW-06	3926176.70	1804528.75	144.71	15.08	49.66	129.63	10.66	29.14	134.05	15.81	49.66	128.90
05-MW-07	3926111.00	1804843.18	145.91	16.10		129.81				17.78	28.35	128.13
05-MW-08	3926573.32	1804993.75	145.73	15.79		129.94	11.23	28.44	134.50	16.39	28.79	129.34
05-MW-09	3926898.84	1804765.31	147.31	17.39	28.63	129.92	12.78	28.26	134.53	18.92	28.63	128.39
05-MW-10	3926151.95	1805152.54	147.90	18.80	30.09	129.10				19.99	30.06	127.91
05-MW-11	3926508.77	1804453.98	149.13				14.95	27.86	134.18			
05-MW-12	3926157.70	1804305.71	147.16				12.87	24.81	134.29			
05-MW-13	3926306.86	1804190.23	147.01									
05-MW-14	3925586.00	1805078.00	142.05									
05-MW-15	3925725.23	1804486.96	143.34									
06-MW-01	3926640.00	1803588.76	151.30	21.77	52.41	129.53	17.10	52.41				
06-MW-02	3926438.83	1803544.45	147.91	18.46	52.64	129.45	13.89	52.64	134.02			
06-MW-03	3926136.57	1803300.78	144.59	15.23	48.36	129.36	10.89	48.36	133.70			
06-MW-04	3926311.90	1803047.49	142.70	13.38	48.43	129.32	8.98	48.43	133.72			
06-MW-05	3926368.72	1803214.00	144.14	14.60		129.54	10.14	17.94	134.00			
06-MW-06	3926311.42	1803740.11	148.92	19.27		129.65	14.68	29.72	134.24			
06-MW-07	3927008.19	1803826.28	151.90									
09-MW-01	3925887.18	1802988.49	142.55	13.29	48.45	129.26	9.12	47.34	133.43	14.50	48.45	128.05
09-MW-02	3925561.03	1802813.90	140.52	11.37	44.93	129.15	7.35	44.93	133.17			
09-MW-03	3926365.99	1802303.17	143.78				10.25	46.96	133.53	16.52	47.24	127.26
09-MW-04	3926072.77	1802387.37	145.52				12.12	7.02	133.40	17.40	47.12	128.12
09-MW-05	3926630.27	1802495.32	141.34				7.55	47.00	133.79	12.71	47.10	128.63
09-MW-06	3926844.91	1802850.48	140.41				6.32	46.51	134.09	11.67	46.84	128.74
09-MW-07	3927135.32	1803116.58	143.67				9.35	23.65	134.32	14.69	23.74	128.98
09-MW-08	3926230.77	1802612.25	150.21									
09-MW-10	3926424.14	1802644.80	166.07									
09-MW-11	3926573.80	1802774.34	163.25									
09-MW-12	3926198.21	1802958.84	141.23									
09-MW-14	3925903.33	1802573.13	146.92				13.58	25.12	133.34	18.91	25.19	128.01
09-MW-15	3925290.16	1802754.76	142.62									
10-MW-01	3926165.16	1803467.19	144.39	15.00		129.39				15.88	46.44	128.51
10-MW-02	3925989.13	1803620.63	144.62	15.25		129.37				16.33	47.43	128.29
10-MW-03	3925916.26	1803383.92	145.00	15.67	47.64	129.33				16.84	47.58	128.16
10-MW-04	3925545.84	1803251.22	143.05									
11-MW-01	No survey data for this well			11.91	18.39	-11.91	7.30	18.2				
11-MW-02	3926502.02	1803274.10	143.82	14.43		129.39	9.87	21.26	133.95			
12-MW-01	3924457.46	1804255.74	141.26				8.49	28.77	132.77	14.27	28.93	126.99
12-MW-02	3924455.73	1804963.34	139.46				6.45	25.31	133.01	12.28	26.13	127.18

GALENA, ALASKA
Monitoring Well Water Level Data

	1993 Survey Data			06-OCT-93			9-JAN-94			19-APR-94		
Well I.D.	Northing	Easting	Elevation To TOC	H20 Depth (From TOC)	Total Depth (From TOC)	Water Elevation	H20 Depth (From TOC)	Total Depth (From TOC)	Water Elevation	H20 Depth (From TOC)	Total Depth (From TOC)	Water Elevation
01-MW-01	3925415.79	1811197.63	145.98									
01-MW-02	3925631.78	1811354.63	145.50									
01-MW-03	3925745.10	1811323.05	147.29									
01-MW-04	3925634.72	1811183.64	144.79									
01-MW-05	3925523.35	1811148.49	146.57									
01-MW-06	3925450.64	1811349.18	147.27									
01-MW-07	3925231.05	1811068.65	143.19									
01-MW-08	3925198.04	1811266.41	153.49									
04-MW-02	3925268.76	1812283.24	147.20									
04-MW-03	3925460.08	1812401.51	145.55									
05-MW-01	3926266.22	1804905.55	150.64	21.31	53.88	129.33	28.07		122.57			
05-MW-02	3925967.52	1805428.72	149.51	20.38	53.48	129.13	26.89		122.62	32.01		117.50
05-MW-03	3926037.36	1805183.76	147.93	18.78	53.73	129.15	25.4		122.53			
05-MW-04	3926029.31	1805029.33	145.82	16.91	49.20	128.91						
05-MW-05	3925969.98	1804904.41	145.57							27.69		117.88
05-MW-06	3926176.70	1804528.75	144.71	15.45	49.66	129.26	22.27		122.44	27.38		117.33
05-MW-07	3926111.00	1804843.18	145.91	16.36		129.55	24.28		121.63			
05-MW-08	3926573.32	1804993.75	145.73	16.00	28.9	129.73	23.65		122.08	27.93		117.80
05-MW-09	3926898.84	1804765.31	147.31	17.67	28.63	129.64	25.77		121.54			
05-MW-10	3926151.95	1805152.54	147.90	18.49	30.09	129.41						
05-MW-11	3926508.77	1804453.98	149.13				26.77		122.36			
05-MW-12	3926157.70	1804305.71	147.16	17.74	25.03	129.42	25.93		121.23			
05-MW-13	3926306.86	1804190.23	147.01	17.69		129.32	24.57		122.44			
05-MW-14	3925586.00	1805078.00	142.05									
05-MW-15	3925725.23	1804486.96	143.34				20.94		122.40			
06-MW-01	3926640.00	1803588.76	151.30	21.90	52.41	129.40	28.78		122.52			
06-MW-02	3926438.83	1803544.45	147.91	18.67	52.64	129.24	25.45		122.46	30.50		117.41
06-MW-03	3926136.57	1803300.78	144.59	15.75	48.7	128.84	22.19		122.40	27.40		117.19
06-MW-04	3926311.90	1803047.49	142.70	13.82	48.43	128.88	20.38		122.32			
06-MW-05	3926368.72	1803214.00	144.14	14.95	18.01	129.19						
06-MW-06	3926311.42	1803740.11	148.92	19.51	30.01	129.41	26.3		122.62	29.78		119.14
06-MW-07	3927008.19	1803826.28	151.90	22.51		129.39	29.35		122.55			
09-MW-01	3925887.18	1802988.49	142.55	14.05	48.45	128.50	20.21		122.34	25.46		117.09
09-MW-02	3925561.03	1802813.90	140.52	12.49	44.93	128.03						
09-MW-03	3926365.99	1802303.17	143.78							26.49		117.29
09-MW-04	3926072.77	1802387.37	145.52							28.38		117.14
09-MW-05	3926630.27	1802495.32	141.34							24.12		117.22
09-MW-06	3926844.91	1802850.48	140.41							22.98		117.43
09-MW-07	3927135.32	1803116.58	143.67									
09-MW-08	3926230.77	1802612.25	150.21									
09-MW-10	3926424.14	1802644.80	166.07									
09-MW-11	3926573.80	1802774.34	163.25									
09-MW-12	3926198.21	1802958.84	141.23									
09-MW-14	3925903.33	1802573.13	146.92							25.15		121.77
09-MW-15	3925290.16	1802754.76	142.62	14.97		127.65	20.36		122.26	25.67		116.95
10-MW-01	3926165.16	1803467.19	144.39				21.96		122.43			
10-MW-02	3925989.13	1803620.63	144.62									
10-MW-03	3925916.26	1803383.92	145.00	16.38	47.64	128.62	22.68		122.32	28.01		116.99
10-MW-04	3925545.84	1803251.22	143.05	14.95		128.10	20.85		122.20			
11-MW-01	No survey data for this well			12.09	18.39	-12.09						
11-MW-02	3926502.02	1803274.10	143.82	14.66	21.26	129.16						
12-MW-01	3924457.46	1804255.74	141.26									
12-MW-02	3924455.73	1804963.34	139.46									

GALENA, ALASKA

Monitoring Well Water Level Data

1993 Survey Data				24 SEP-94		
Well I.D.	Northing	Easting	Elevation To TOC	H20 Depth (From TOC)	Total Depth (From TOC)	Water Elevation
01-MW-01	3925415.79	1811197.63	145.98			
01-MW-02	3925631.78	1811354.63	145.50			
01-MW-03	3925745.10	1811323.05	147.29			
01-MW-04	3925634.72	1811183.64	144.79			
01-MW-05	3925523.35	1811148.49	146.57			
01-MW-06	3925450.64	1811349.18	147.27			
01-MW-07	3925231.05	1811068.65	143.19			
01-MW-08	3925198.04	1811266.41	153.49			
04-MW-02	3925268.76	1812283.24	147.20			
04-MW-03	3925460.08	1812401.51	145.55			
05-MW-01	3926266.22	1804905.55	150.64			
05-MW-02	3925967.52	1805428.72	149.51	21.56		127.95
05-MW-03	3926037.36	1805183.76	147.93			
05-MW-04	3926029.31	1805029.33	145.82			
05-MW-05	3925969.98	1804904.41	145.57			
05-MW-06	3926176.70	1804528.75	144.71	16.69		128.02
05-MW-07	3926111.00	1804843.18	145.91			
05-MW-08	3926573.32	1804993.75	145.73	17.16		128.57
05-MW-09	3926898.84	1804765.31	147.31			
05-MW-10	3926151.95	1805152.54	147.90			
05-MW-11	3926508.77	1804453.98	149.13	20.63		128.50
05-MW-12	3926157.70	1804305.71	147.16	18.89		128.27
05-MW-13	3926306.86	1804190.23	147.01	18.72		128.29
05-MW-14	3925586.00	1805078.00	142.05	19.29		122.76
05-MW-15	3925725.23	1804486.96	143.34	15.92		127.42
06-MW-01	3926640.00	1803588.76	151.30	22.87		128.43
06-MW-02	3926438.83	1803544.45	147.91	19.78		128.13
06-MW-03	3926136.57	1803300.78	144.59	17.00		127.59
06-MW-04	3926311.90	1803047.49	142.70	14.99		127.71
06-MW-05	3926368.72	1803214.00	144.14	16.19		127.95
06-MW-06	3926311.42	1803740.11	148.92	20.62		128.30
06-MW-07	3927008.19	1803826.28	151.90	23.30		128.60
09-MW-01	3925887.18	1802988.49	142.55	15.37		127.18
09-MW-02	3925561.03	1802813.90	140.52	13.84		126.68
09-MW-03	3926365.99	1802303.17	143.78	16.15		127.63
09-MW-04	3926072.77	1802387.37	145.52	18.20		127.32
09-MW-05	3926630.27	1802495.32	141.34	13.48		127.86
09-MW-06	3926844.91	1802850.48	140.41	12.17		128.24
09-MW-07	3927135.32	1803116.58	143.67	15.03		128.64
09-MW-08	3926230.77	1802612.25	150.21			
09-MW-10	3926424.14	1802644.80	166.07			
09-MW-11	3926573.80	1802774.34	163.25			
09-MW-12	3926198.21	1802958.84	141.23			
09-MW-14	3925903.33	1802573.13	146.92			
09-MW-15	3925290.16	1802754.76	142.62			
10-MW-01	3926165.16	1803467.19	144.39	16.81		127.58
10-MW-02	3925989.13	1803620.63	144.62			
10-MW-03	3925916.26	1803383.92	145.00	17.77		127.23
10-MW-04	3925545.84	1803251.22	143.05			
11-MW-01	No survey data for this well					
11-MW-02	3926502.02	1803274.10	143.82	15.76		128.06
12-MW-01	3924457.46	1804255.74	141.26			
12-MW-02	3924455.73	1804963.34	139.46			

1992 Survey Data

RADIAN CORPORATION

Galena and Campion AFS, Alaska

SAMPLE LOCATIONS

Site 01 (Fire Training Site)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
01-SD-01		1163	3925849	1811179	144.0
01-SD-02		1169	3925653	1811507	144.2
01-MW-01	145.93	1158	3925416	1811198	143.2
01-MW-02	145.47	1161	3925632	1811355	143.1
01-MW-03	147.08	1162	3925745	1811323	144.7
01-MW-04	144.53	1145	3925635	1811184	142.7
01-MW-05	146.30	1160	3925523	1811149	143.4
01-MW-06	147.03	1157	3925451	1811350	143.7
01-SB-01		1148	3925639	1811297	143.2
01-SB-02		1152	3925522	1811249	142.7
01-SS-01		1159	3925460	1811193	143.0
01-SS-02		1151	3925500	1811220	142.8
01-SS-03		1153	3925480	1811265	142.5
01-SS-04		1156	3925432	1811360	144.4
01-SS-05		1154	3925503	1811285	142.7
01-SS-06		1155	3925535	1811310	142.8
01-SS-07		1147	3925576	1811244	142.7
01-SS-08		1146	3925593	1811252	142.1
01-SS-09		1150	3925609	1811182	142.9
01-SS-10		1149	3925672	1811281	143.9
01-SW-01		1164	3925885	1810891	143.7
01-SW-02		1168	3925664	1811542	143.2

Site 04 (Ambient Site)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
04-SD-01		1166	3925152	1811943	145.8
04-SD-02		1165	3925424	1811918	145.7
04-SD-03		1175	3925489	1812169	145.3
04-SD-04		1174	3925663	1812363	145.1
04-MW-02	147.14	1167	3925269	1812284	147.4
04-MW-03	145.50	1171	3925460	1812402	146.0
04-SS-01		1173	3925682	1812558	147.2
04-SS-02		1170	3925327	1812408	147.4
04-SS-03		1172	3925486	1812605	150.1
04-SW-01		1166	3925152	1811943	145.8
04-SW-02		1165	3925424	1811918	145.7
04-SW-03		1175	3925489	1812169	145.3
04-SW-04		1174	3925663	1812363	145.1

Site 05 (POL)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
05-SD-01		1144	3926401	1805059	142.2
05-SD-02		1130	3926508	1805228	136.8
05-MW-01	150.66	1106	3926266	1804906	148.5
05-MW-02	149.55	1126	3925967	1805429	147.4
05-MW-03	147.97	1122	3926037	1805184	145.8
05-MW-04	145.84	1121	3926029	1805030	143.6
05-MW-05	145.58	1124	3925970	1804904	143.2
05-MW-06	144.58	1116	3926176	1804529	142.4
05-MW-07	145.74	1100	3926111	1804843	143.1
05-MW-08	145.42	1105	3926573	1804994	141.8
05-MW-09	147.08	1104	3926899	1804766	145.0
05-MW-10	147.69	1110	3926152	1805153	145.0
05-MW-11	149.13	1127	3926509	1804454	146.2
05-MW-12	146.97	1125	3926157	1804306	145.3
05-SB-01		1107	3926260	1804959	144.3
05-SB-02		1114	3926083	1804968	144.0
05-SB-03		1111	3926138	1805191	146.3
05-SS-01		1128	3926537	1804511	147.4
05-SS-02		1103	3926445	1804697	145.4
05-SS-03		1102	3926380	1804752	143.5
05-SS-04		1108	3926306	1804963	144.7
05-SS-05		1113	3926279	1805078	145.2
05-SS-06		1143	3926216	1804914	144.1
05-SS-07		1109	3926208	1804996	144.9
05-SS-08		1112	3926219	1805215	144.3
05-SS-09		1115	3926129	1804894	143.8
05-SS-10		1101	3926192	1804771	143.3
05-SS-11		1120	3926020	1805026	143.3
05-SS-12		1117	3926179	1804646	143.0
05-SS-13		1118	3926131	1804711	143.2
05-SS-14		1123	3926076	1805216	142.5
05-SS-15		1119	3926089	1804857	142.8
05-SW-01		1131	3926623	1805137	136.2
05-SW-02		1130	3926508	1805228	136.8
05-SW-03		1129	3926397	1805307	137.0
05-RW-01	146.57	1133	3926131	1805104	144.3
05-RW-02	146.08	1132	3926093	1804964	143.9

Site 06 (Waste Accumulation Area)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
06-SD-01		1239	3926496	1803249	137.5
06-SD-02		1232	3926328	1803037	137.4
06-MW-01	151.30	1194	3926640	1803589	148.8
06-MW-02	147.92	1193	3926439	1803544	145.3
06-MW-03	144.60	1198	3926137	1803301	142.4
06-MW-04	142.71	1230	3926312	1803047	140.6
06-MW-05	143.91	1233	3926369	1803213	140.9
06-MW-06	148.72	1203	3926311	1803741	146.4
06-SB-01		1234	3926443	1803253	145.8
06-SB-02		1214	3926186	1803302	142.1
06-SS-01		1235	3926428	1803304	145.5
06-SS-02		1196	3926317	1803348	141.4
06-SS-03		1197	3926212	1803303	142.4
06-SS-04		1204	3926332	1803759	146.3
06-SS-05		1195	3926300	1803678	145.7
06-SS-06		1205	3926271	1803755	145.5
06-SW-01		1238	3926524	1803245	134.8
06-SW-02		1229	3926204	1802935	135.0

Site 07 (Campion)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
07-SB-01		1189	3914398	1840031	365.4
07-SB-02		1190	3914517	1839985	365.1
07-SB-03		1188	3914537	1840237	358.5
07-SD-01		1183	3914532	1840248	358.2
07-SD-02		1187	3914639	1840506	347.3
07-MW-01	370.54	1181	3914277	1840068	368.4
07-MW-02	362.92	1182	3914547	1840139	360.5
07-MW-03	368.52	1177	3914671	1839895	365.7
07-MW-04	390.08	1191	3914455	1839655	387.8
07-SS-01		1176	3914582	1839833	369.5
07-SS-02		1180	3914451	1840089	362.7
07-SS-03		1178	3914552	1840045	362.7
07-SS-04		1184	3914562	1840356	353.5
07-SS-05		1186	3914621	1840459	349.3
07-SW-01		1179	3914518	1840067	362.6
07-SW-02		1185	3914563	1840369	353.3

Site 09 (Million Gallon Hill)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
09-MW-01	142.54	1215	3925887	1802988	140.4
09-MW-02	140.52	1219	3925561	1802814	141.0
09-MW-03	143.77	1223	3926366	1802304	141.5
09-MW-04	145.49	1216	3926073	1802387	143.2
09-MW-05	141.24	1224	3926630	1802495	139.0
09-MW-06	140.38	1226	3926845	1802849	137.9
09-MW-07	143.68	1192	3927135	1803117	144.3
09-MW-08	150.26	1218	3926230	1802612	150.5
09-MW-10	166.06	1221	3926424	1802645	166.4
09-MW-11	163.27	1222	3926574	1802775	163.6
09-MW-12	141.23	1228	3926198	1802959	141.7
09-MW-14	146.86	1217	3925904	1802573	143.7
09-SS-01		1227	3926553	1802863	156.3
09-SS-02		1225	3926689	1802614	141.1
09-SS-03		1220	3926264	1802463	141.2

Site10 (Vehicle Maintenance Building)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
10-MW-01	144.30	1200	3926165	1803467	141.7
10-MW-02	144.63	1206	3925989	1803621	142.4
10-MW-03	145.00	1211	3925916	1803384	142.7
10-SB-01		1199	3926101	1803344	142.3
10-SB-02		1202	3926068	1803522	141.5
10-SB-03		1210	3925916	1803460	141.6
10-SS-01		1201	3926090	1803527	141.1
10-SS-02		1213	3926012	1803478	141.9
10-SS-03		1208	3925988	1803556	142.7
10-SS-04		1212	3925950	1803371	141.3
10-SS-05		1207	3925975	1803727	142.1
10-SS-06		1209	3925947	1803519	139.3

Site11 (Undeground Storage Tank)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
11-MW-02	143.83	1237	3926502	1803274	144.4
11-SB-01		1231	3926321	1803056	139.9
11-SS-01		1236	3926503	1803286	145.4

Site12 (South of Airstrip)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
12-MW-01	141.23	1253	3924457	1804256	141.7
12-MW-02	139.45	1252	3924456	1804963	139.9

SVE Locations (Extraction Well)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
I-1		1136	3926108	1804887	148.1
I-2		1142	3926177	1804942	144.2
I-3		1134	3926249	1804890	149.0
V-1		1139	3926157	1804838	148.4
V-2		1138	3926137	1804859	148.4
V-3		1137	3926117	1804879	148.2
V-4		1141	3926230	1804868	149.0
V-5		1140	3926199	1804836	148.9

Building Corner Locations

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
A		1248	3926401	1803648	149.1
B		1241	3926365	1803639	148.8
C		1242	3926303	1803653	145.7
D		1243	3926283	1803653	145.5
E		1244	3926303	1803674	145.6
F		1245	3926283	1803602	146.0
G		1246	3926249	1803602	145.8
H		1247	3926249	1803636	146.1
I		1249	3926250	1803674	145.8
J		1250	3925906	1803780	144.0
K		1251	3925914	1803779	143.9
L		1263	3926260	1803674	
M		1264	3926281	1803674	

Wells Located Inside Buildings (See Field Book Sketch)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
WELL #1		1271	3925910	1803784	
WELL #2		1268	3926254	1803668	
WELL #3		1267	3926266	1803683	
WELL #4		1262	3926383	1803658	

Private Well Locations (See Field Book Sketch)

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
PRIVATE WELL		1255	3923857	1806877	149.4
PRIVATE WELL		1256	3923918	1806853	149.2
2 PRIV.WELLS		1254	3923458	1805445	124.5

Exstraction Well Location

DESCRIPTION	TOP OF WELL ELEVATION	POINT #	NORTHING	EASTING	GROUND ELEVATION
EXT. WELL		1135	3926172	1804813	150.0

1993 Survey Data

1993 Survey Data

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
Fire Protection Training Area				
01-MW-01	47	3925416	1811198	145.98
01-MW-02	43	3925632	1811355	145.50
01-MW-03	44	3925745	1811323	147.29
01-MW-04	45	3925635	1811184	144.79
01-MW-05	46	3925523	1811148	146.57
01-MW-06	48	3925451	1811349	147.27
01-MW-07	148	3925231	1811069	143.19
01-MW-08	149	3925198	1811266	153.49
01-SB-03	267	3925319	1811244	146.33
01-SB-04	268	3925208	1811228	151.00
Galena Ambient Location				
04-MW-02	50	3925269	1812283	147.20
04-MW-03	51	3925460	1812402	145.55
POL Tank Farm				
05-MW-01	94	3926266	1804906	150.64
05-MW-02	89	3925968	1805429	149.51
05-MW-03	88	3926037	1805184	147.93
05-MW-04	87	3926029	1805029	145.82
05-MW-05	86	3925970	1804904	145.57
05-MW-06	79	3926177	1804529	144.71
05-MW-07	90	3926111	1804843	145.91
05-MW-08	95	3926573	1804994	145.73
05-MW-09	96	3926899	1804765	147.31
05-MW-10	91	3926152	1805153	147.90
05-MW-11	92	3926509	1804454	149.13
05-MW-12	77	3926158	1804306	147.16
05-MW-13	126	3926307	1804190	147.01
05-MW-14	143	3924798	1801950	142.05
05-MW-15	142	3925725	1804487	143.34
05-SB-04	181	3926603	1804295	148.01
05-SB-05	182	3926405	1804398	146.16
05-SB-06	184	3926531	1804509	147.24
05-SS-16	139	3926536	1804600	147.55
05-SS-17	135	3926407	1804627	146.52
05-SS-18	183	3926324	1804719	145.47
05-SS-19	136	3926256	1804796	145.49
05-SS-20	137	3926155	1805004	144.21

1993 Survey Data (Continued)

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
05-SS-21	138	3926112	1805163	148.56
05-SS-22	134	3926032	1804954	143.51
West Unit				
06-MW-01	58	3926640	1803589	151.30
06-MW-02	30	3926439	1803544	147.91
06-MW-03	32	3926137	1803301	144.59
06-MW-04	54	3926312	1803047	142.70
06-MW-05	55	3926369	1803214	144.14
06-MW-06	57	3926311	1803740	148.92
06-MW-07	125	3927008	1803826	151.90
06-SB-03	186	3926623	1803483	148.32
06-SS-07	124	3926371	1803752	148.85
06-SS-08	104	3926401	1803759	147.23
06-SS-09	103	3926394	1803690	148.92
06-SS-10	102	3926353	1803645	148.00
06-SS-11	100	3926385	1803522	144.33
06-SS-12	99	3926434	1803557	145.39
06-SS-13	105	3926419	1803477	144.03
06-SS-14	101	3926290	1803572	144.64
09-MW-01	34	3925887	1802988	142.55
09-MW-02	28	3925561	1802814	140.52
09-MW-03	65	3926366	1802303	143.78
09-MW-04	62	3926073	1802387	145.52
09-MW-05	66	3926630	1802495	141.34
09-MW-06	69	3926845	1802850	140.41
09-MW-07	72	3927135	1803117	143.67
09-MW-08	64	3926231	1802612	150.21
09-MW-10	73	3926424	1802645	166.07
09-MW-11	74	3926574	1802774	163.25
09-MW-12	53	3926198	1802959	141.23
09-MW-14	39	3925903	1802573	146.92
09-MW-15	140	3925290	1802755	142.62
09-SB-01	262	3925616	1802858	142.14
10-MW-01	56	3926165	1803467	144.39
10-MW-02	31	3925989	1803621	144.62
10-MW-03	33	3925916	1803384	145.00
10-MW-04	141	3925546	1803251	143.05
10-SB-04	187	3926121	1803477	141.51

1993 Survey Data (Continued)

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
10-SB-05	188	3926025	1803545	142.76
10-SS-07	117	3926035	1803609	140.47
10-SS-08	118	3925959	1803622	139.49
10-SS-09	119	3925961	1803589	139.82
10-SS-10	120	3925988	1803531	142.12
10-SS-11	121	3925953	1803491	139.35
10-SS-12	122	3925993	1803497	142.25
11-MW-02	61	3926502	1803274	143.82
11-SS-02	109	3926500	1803379	145.36
11-SS-03	110	3926600	1803462	147.06
11-SS-04	114	3926575	1803343	144.99
11-SS-05	116	3926609	1803281	140.67
11-SS-06	115	3926499	1803317	145.34
11-SS-07	113	3926414	1803208	140.81
11-SS-08	112	3926399	1803383	145.27
11-SS-09	106	3926322	1803408	142.50
11-SS-10	107	3926309	1803258	140.53
Control Tower Drum Storage Area				
MW-037	144	3925735	1805639	148.74
MW-038	145	3925532	1805640	146.80
MW-039	146	3925546	1806006	146.94
Campion POL Area				
07-MW-01	279	3914277	1840067	371.09
07-MW-02	278	3914547	1840140	363.46
07-MW-03	277	3914671	1839895	369.22
07-MW-04	276	3914456	1839655	390.08
07-SD-03	285	3914661	1840708	337.11
07-SD-04	286	3914695	1840892	328.65
07-SD-05	288	3914694	1841099	317.63
07-SD-06	291	3914737	1841295	305.19
07-SD-07	290	3914772	1841489	295.24
07-SS-06	281	3914466	1840159	361.14
07-SS-07	282	3914528	1840297	356.37
Base Supply Wells				
No. 2	292	1.00e-09	1.00e-09	145.47
Treatability Study Air Sparging Wells				
A-1	249	3926085	1805029	148.39
A-10	211	3926070	1805189	143.70

1993 Survey Data (Continued)

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
A-11	212	3926066	1805203	143.44
A-12	213	3926061	1805219	143.59
A-13	214	3926056	1805236	144.22
A-14	215	3926051	1805249	144.78
A-2	237	3926077	1805047	143.82
A-3	238	3926072	1805061	143.19
A-4	239	3926066	1805077	143.00
A-5	240	3926061	1805092	143.37
A-6	241	3926055	1805107	144.67
A-7	242	3926049	1805122	145.27
A-8	209	3926079	1805157	144.27
A-9	210	3926074	1805173	144.06
Treatability Study Soil Sample Locations				
B-1	254	3926054	1805035	143.80
B-10	261	3926075	1805207	143.26
B-11	256	3926029	1805163	146.68
B-12	257	3926023	1805179	147.19
B-17	201	3926034	1805201	145.43
B-2	250	3926095	1805051	148.84
B-3	251	3926082	1805084	143.69
B-4	253	3926047	1805091	145.83
B-5	252	3926026	1805104	147.50
B-6	255	3926029	1805041	145.40
B-7	258	3926063	1805159	145.13
B-8	259	3926059	1805172	145.44
B-9	260	3926085	1805178	144.05
Treatability Study Extraction Wells				
E-1	235	3926052	1805063	143.74
E-2	217	3926046	1805197	145.10
Treatability Study Monitoring Wells				
MW-2	236	3926060	1805066	142.87
MW-3	234	3926039	1805058	146.37
MW-6	204	3926056	1805197	144.30
Treatability Study Steam Points				
S-1	248	3926090	1805043	148.63
S-2	247	3926083	1805059	144.07
S-3	246	3926079	1805073	142.95
S-4	245	3926073	1805088	142.95

1993 Survey Data (Continued)

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
S-5	244	3926068	1805103	143.66
S-6	243	3926063	1805118	144.93
Treatability Study Vapor Probes				
V-1	230	3926065	1805059	143.08
V-10	228	3926085	1805109	144.04
V-11	208	3926065	1805171	144.81
V-12	207	3926055	1805168	145.12
V-13	206	3926045	1805165	145.24
V-14	199	3926036	1805161	145.85
V-15	203	3926054	1805208	144.27
V-16	202	3926044	1805205	145.06
V-18	200	3926023	1805199	145.67
V-19	198	3926038	1805151	145.47
V-2	231	3926055	1805055	142.92
V-20	197	3926042	1805140	145.63
V-3	232	3926045	1805052	144.48
V-4	233	3926035	1805048	145.94
V-5	227	3926051	1805095	144.71
V-6	226	3926042	1805094	146.15
V-7	225	3926032	1805095	146.75
V-8	224	3926023	1805095	147.40
V-9	229	3926090	1805088	144.07
Treatability Study Air Sampling Stations				
SP-1	42	3924461	1803983	156.95
SP-2 (new)	270	3923916	1807626	151.08
SP-2 (old)	41	3924501	1806943	143.03
SP-3	194	3926159	1804527	142.25
SP-4	185	3926870	1804726	150.12
SP-5	195	3925891	1805108	144.21
SP-6	158	3925866	1808987	157.91
Yukon River				
River Measure Point	49	3924869	1812194	149.18
Old River Gauge--150' mark	293	1.00e-09	1.00e-09	149.32
North edge of Yukon River Bank--top water	15	3924630	1811166	131.90
North edge of Yukon River Bank--top water	24	3924370	1802772	131.28
North edge of Yukon River Bank--top water	23	3924499	1802416	131.17
North edge of Yukon River Bank--top water	22	3923611	1807687	131.60
North edge of Yukon River Bank--top water	20	3923773	1805220	131.11

1993 Survey Data (Continued)

Description	Point #	Northing	Easting	Ground Elevation or Top of Well Casing
North edge of Yukon River Bank--top water	19	3923483	1806553	131.45
North edge of Yukon River Bank--top water	18	3923842	1808648	131.57
North edge of Yukon River Bank--top water	16	3924390	1810399	131.82
North edge of Yukon River Bank--top water	25	3924263	1803413	131.33
North edge of Yukon River Bank--top water	26	3923960	1804273	131.54
North edge of Yukon River Bank--top water	17	3924035	1809350	131.66
North edge of Yukon River Bank--top water	14	3925376	1813128	131.96
North edge of Yukon River Bank--top water	27	3924760	1801956	131.08
Pump Test Wells				
KV-1	128	3926180	1804512	146.02
KV-2	131	3926173	1804538	146.01
KV-3	132	3926167	1804527	145.64
KV-4a	133	3926157	1804538	145.94
KV-5	127	3926165	1804513	145.21
KV-6a	129	3926186	1804530	145.56
PW-1	130	3926182	1804546	146.11
Miscellaneous				
12-MW-01	7	3924457	1804256	141.26
12-MW-02	8	3924456	1804963	139.46
STA #8 (R&M Basis of Coord.)	1	3925110	1803535	142.60
Stake Furthest NW-West Runway	171	3925986	1802195	141.75

APPENDIX F

Hydrocarbon Recovery Testing at Galena Airport

The purpose of this Appendix is to document the results and draw some preliminary conclusions and recommendations from the hydrocarbon recovery testing performed at Galena Airport during 17-19 September 1992, 12-23 July 1993, and 13-16 April 1994. More detailed results and discussion of these tests is provided in the *Treatability Study Final Report* (USAF/Radian, January 1995).

The feasibility of recovery of light, non-aqueous phase hydrocarbons (LNAPL) using product skimming was determined using two methods: 1) baildown testing (1992, 1993, and 1994) and 2) hydrocarbon recovery (skimming) tests (1993 and 1994). Baildown testing was performed on 5 wells in the POL area (05-RW-1, 05-RW-2, 05-MW-04, 05-W-2, and 05-MW-10) and 1 well in the Million Gallon Hill area (05-MW-08). The baildown testing was used to determine if a skimming test was practical. Of the five wells, skimming tests were performed at three of the wells in POL (05-RW-1, 05-RW-2, and 05-MW-10) during 1993 and one well (05-RW-2) in 1994.

1992 Baildown Tests

During the final stages of the 1992 Galena field season, two 6-in. Diameter hydrocarbon recovery wells were installed in the POL (05-RW-01 and 05-RW-02). These wells were located in areas of known occurrence of floating product. A hydrocarbon recovery system (SOS product-only system) and a portable air compressor were purchased and shipped to Galena to conduct field recovery tests. The close of 1992 field activities prevented the testing of the hydrocarbon skimmer system in the recovery wells. However, two short duration (3 day) baildown tests were conducted on recovery well 05-RW-01 and a nearby standard 2-in. Monitoring well (05-MW-10). The results of the baildown tests are shown in Figures 1 and 2.

Both the 6-in. and 2-in. wells displayed similar water and product level behavior during the baildown tests. An LNAPL layer, which was originally around 1.5 ft thick in the wells, was nearly completely removed by bailing at the start of the test. Following baildown, the

amount of free product recovered slowly throughout the monitoring period. Maximum apparent product thicknesses observed following baildown were around 0.4 ft.

Analysis of the data focused on determining the inflection point on the water level versus time recovery curve. According to Gruszczenski (1987), the actual formation thickness corresponds to this inflection point. In other words, after the product level in the well is reduced by pumping or bailing, the water level first rises and then falls. The point where the water level starts to fall is the inflection point. The product thickness at that point is the estimated true LNAPL thickness in the formation. Generally, there is a 70 to 95 percent reduction between the apparent hydrocarbon thickness observed in a well and the true formation thickness.

For well 05-RW-01, an inflection point in water levels was observed rather quickly (within 90 minutes), with a second leveling off inflection point after about 2600 minutes. The product thickness corresponding with the first inflection point was 0.15 ft. For monitor well 05-MW-10, the inflection point occurred even more quickly, after only 30 minutes. The corresponding product thickness was 0.03 ft. The different responses for the two wells may reflect the differences in casing diameters. Because the magnitude of the water level change in both wells was so small and occurred so rapidly, there is some uncertainty as to the validity of the true product thickness estimates.

1993 Baildown and Skimming Test

The goals of the baildown and skimming tests conducted in 1993 were twofold: 1) to determine the recharge rate of LNAPL from the formation into the well; and 2) to attempt once again to determine the true product thickness in the formation. The test results are summarized in Table 1.

Baildown testing was performed in two different ways. In the case of wells 05-RW-1 and 05-RW-2, skimming tests were performed initially. The LNAPL in each well was

effectively bailed down during the skimming test. Following the test, the recovery of water and hydrocarbon were monitored over time.

The first recovery test was conducted at recovery well 1 (05-RW-1) because of its large original product thickness (2.00 ft). The test was conducted over three days. The objective was to gradually reduce the product thickness to a point where the recharge of the hydrocarbon in the well was equal to or greater than the extraction rate of the SOS system. If this could be achieved, it would be a clear indication that hydrocarbon recovery by this method is feasible.

The results of the skimming test at 05-RW-1 are presented in Figure 3. Over the three day test, we were not able to reduce the extraction rate low enough to match the recovery rate. Therefore, the product thickness continued to fall until it was essentially zero on the third day.

The SOS system was also tested at recovery well 2 (05-RW-2) and monitor well 10 (05-MW-10) with very similar results; the system reduced the product thickness to basically zero and then recovered what little product entered the well from the formation (Figures 4 and 5).

In the case of 09-MW-08, 05-MW-10, and 05-MW-04, the baildown test was performed first, which is the conventional method. Floating hydrocarbons and water were purged from the well using a Teflon bailer. The water and hydrocarbon levels in the well were then allowed to recovery over a 3 to 10 day period; water and product levels were monitored throughout the recovery period.

The results of the baildown tests are shown in Figure 5 through 7 and the center portion of Table 1. In Table 1, the "Time = 0 Thickness" is the product thickness immediately after baildown of the well. Also presented is the product thickness at elapsed times (1, 6, 24, 36, and 48 hours) following the baildown test. In parentheses is the percentage of the original product thickness (before the baildown test). After one hour, only one well showed a high rate of recharge; 05-MW-10 had recovered to 44% of its original product thickness. Therefore, 05-MW-

10 was considered a good candidate for hydrocarbon recovery testing using the SOS system. Conversely, 05-MW-04 did not recover any product 48 hours after its baildown. Although 09-MW-08 showed moderate recharge into the well, it was not a good candidate for recovery testing due to its isolation from an electrical source.

Unfortunately, we were never able to clearly observe the inflection point in any of the baildown/skimming tests. Possible explanations for the observed trends are as follows:

- For wells 05-RW-1 and 05-RW-2, the SOS skimming system did not recover LNAPL quickly enough to produce a distinctive drop in the product thickness; therefore, the water levels did not rise quickly in response to the product removal step.

- For the other wells, a rapid recharge of water levels occurred immediately following baildown without the characteristic gradual rise and fall normally observed; this is probably caused by recharge through the deeper portion of the well screens which are completed in the more permeable sand and gravel strata.

- For all wells, the water levels gradually declined throughout the static and recovery segments of the test; this reflects the normal regional decline of the water table post breakup of the Yukon River, and complicated analysis of the observed baildown results.

- Finally, the tenacious behavior of silty materials in the upper portion of the unconfined aquifer for free-phase product prevented adequate recharge of the wells; the LNAPLs were essentially bound within the pore spaces of the silty strata above the capillary fringe zone.

An alternate, conservative method for determining the formation thickness is outlined by Testa and Paczkowski (1989). Essentially, this method states that the actual formation thickness is the observed thickness multiplied by (1 - specific gravity of the product). The "Estimated Thickness" row in Table 1 was calculated using this method, assuming a LNAPL specific gravity of 0.8 g/cm^3. Values for estimated true product thickness ranged from 0.03 to 0.4 ft.

To predict the recovery rate of the SOS system, we used the baildown test product recovery results. As shown in Table 2, the product thickness in 05-RW-1 recovered 0.015 ft in six hours. For this 6-in. diameter well, this converts to a recharge rate of 0.005 gph, or 0.116 gal./day (42 gal./year), if operated continuously. Monitor well 05-MW-10 (2-in. diameter) had the highest rate of recovery (2 gal./day), and the highest relative volume (243% of amount initially present) of the five wells tested. However, there are several reasons why these recovery numbers may be inexact. First, this recovery rate may decrease over time as the product in the formation is reduced. Second, the system will not be operated continuously because it requires periodic maintenance and downtime. Finally, the recovery rates are likely to change in response to seasonal changes in water levels (i.e., recovery rates are expected to increase during fall and winter).

The results of the Phase III LNAPL recovery tests conducted in April 1994 are summarized in Tables F-3 and F-4. As anticipated, the lower water table during this portion of the year resulted in greater LNAPL thicknesses in the formation and higher product recovery rates. Product thicknesses of up to 2.72 ft were measured in POL area wells, with estimated formation thicknesses of up to 0.54 ft in well 05-W-2. Skimming tests conducted in well 05-RW-2, which had an estimated product thickness of 0.45 ft, succeeded in recovering 4.68 gallons of LNAPL in less than eight hours of operation. Although operational difficulties associated with ice formation complicated the 1994 skimming tests, the 1994 product recovery rate was more than five times that measured during July 1993 tests.

Conclusions

Based on the baildown testing and hydrocarbon skimming tests that were performed at the Galena Airport, we offer the following conclusions:

- The maximum true product thickness observed in the POL area during the summer and fall is about 0.15 ft;

- The maximum true product thickness estimated in the summer 1993 was about 0.4 ft, based on an approximate method;
- The maximum true product thickness estimated in April 1994 was 0.54 ft.
- The SOS Recovery System is capable of recovering the product which is found in the upper silty or lower gravelly sand zones of the unconfined aquifer below the POL;
- During the April 1994 recovery testing, the system recovered much more product than the volume that was originally present in the well; and
- Implementation of an LNAPL recovery system at the POL is feasible.

Interpretation and Recommendations

Baildown and skimming tests conducted during the fall 1992, summer 1993, and late winter 1994 on six groundwater wells in the POL and Million Gallon Hill areas detected a thin LNAPL layer in the silty aquifer increasing in thickness as the water table drops into the lower gravelly sand horizon during the winter months. The tests indicated that a product-only recovery system like the SOS system would be capable of removing the floating LNAPL layer, albeit at a slow rate during the summer months. Possible reasons that the recovery tests were not able to precisely define the product thicknesses were presented earlier.

Substantially different hydrologic conditions exist during low water table periods than during summer months. Baildown tests conducted during April 1994, when the LNAPL layer resides primarily in the gravelly sand layer indicate that a significant product thickness (greater than 0.50 ft) is present.

Skimming test conducted at this time succeeded in recovering more than four gallons of LNAPL from one well in less than eight hours; several times the recovery rate observed in earlier tests.

Detailed conclusions and recommendations are included in the *Treatability Study Final Report* (USAF/Radian, January 1995).

References

USAF/Radian *Treatability Study Final Report.* January 1995

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Table 1

Galena Hydrocarbon Recovery Summary

Well ID	05-RW-1	05-RW-2	05-MW-04	05-MW-10	09-MW-08
Initial Measurements					
Original Product Level	13.73	13.48	13.42	15.63	18.68
Original Water Level	15.73	13.65	14.00	16.79	19.68
Original Product Thickness	2.00	0.17	0.58	1.16	1.00
Original Volume	2.94 gal.	0.25 gal	0.09 gal	0.19 gal	0.16 gal
Recovery Results					
Time = 0 Thickness	0.00	0.02	0.00	0.00	0.01
1 Hour Thickness	0.00 (0.0%)	0.02 (11.8%)	0.00 (0.0%)	0.50 (43.9%)	0.07 (7.0%)
6 Hour Thickness	0.02 (1.0%)	0.03 (17.6%)	0.01 (1.7%)	0.80 (69.0%)	0.15 (15.0%)
24 Hour Thickness	0.09 (4.5%)	0.03 (17.6%)	0.01 (1.7%)	0.85 (73.3%)	0.30 (30.0%)
30 Hour Thickness	0.10 (5.0%)	0.03 (17.6%)	0.00 (0.0%)	0.92 (79.3%)	0.30 (30.0%)
48 Hour Thickness	0.25 (12.5%)	0.01 (5.9%)	0.00 (0.0%)	0.91 (78.4%)	0.32 (32.0%)
Estimated Formation Thickness	0.40	0.03	0.12	0.23	0.20
Skimming Results					
Well Skimmed?	Yes	Yes	No	Yes	No
Recovered Volume	5.23 gal (178%)	0.16 gal (64%)	--	0.46 gal (243%)	--

Note: All results in feet.

Table 2

Estimated Hydrocarbon Recovery Rates

Well ID	05-RW-1	05-RW-2	05-MW-10
Hourly Recovery (gph)	0.005	0.002	0.08
Daily Recovery (gpd)	0.116	0.06	2.0
Yearly Recovery (gpy)	42	21	715

Table F-3
Phase III LNAPL Thickness Survey (Winter 1994)

Date	Time	Well ID	Product Depth (ft)	Water Depth (ft)	Product Thickness (ft)	Comments
4/13/94	1500	05-MW-04	27.7	30.08	2.38	
4/13/94	1512	05-MW-03	30.24	30.85	0.61	
4/13/94	1530	05-MW-02	No product	32.01	0	
4/13/94	1547	05-MW-37	No product	No water	0	Dry well 28.50 depth to bottom
4/13/94	1620	05-MW-05	27.69	27.69	Sheen	Sheen
4/13/94	1640	05-MW-01	27.86	30.19	2.33	
4/13/94	1655	05-MW-10	28.88	No water	1.52	30.40 depth to bottom
4/13/94	1705	W-5	No product	33.03	0	Treatability study well
4/13/94	1710	05-MW-01	28.41	29.64	1.23	29.9 depth to bottom
4/13/94	1730	05-MW-08	No product	27.93	0	
4/13/94	1740	05-MW-09	No product	No water	0	28.3 depth to bottom
4/13/94	1745	05-MW-11	No product	No water	0	27.6 depth to bottom
4/13/94	1800	05-MW-13	No product	No water	0	27.6 depth to bottom
4/13/94	1805	05-MW-12	No product	No water	0	24.9 depth to bottom
4/13/94	1815	KV-1	No product	No water	0	23.4 depth to bottom
4/13/94	1820	KV-6	No product	27.95	0	
4/13/94	1828	6" Pump Well	No product	26.71	0	
4/13/94	1830	KV-2	No product	27.13	0	
4/13/94	1835	KV-4	No product	27.84	0	
4/13/94	1840	KV-3	No product	22.84	0	23.10 depth to bottom
4/13/94	1845	05-MW-06	No product	27.38	0	Has a transducer in it
4/13/94	1850	KV-5	No product	28	0	
4/14/94	1750	05-MW-15	--	--	--	Could not open, well cap damaged
4/14/94	1800	05-MW-14	--	--	--	Could not locate, covered by 2 in. of ice
4/14/94	1820	05-MW-38	--	--	--	Could not locate under 2 ft of snow
4/14/94	1820	05-MW-39	--	--	--	Could not locate under 2 ft of snow
4/16/94	845	05-MW-07	30.33	31.14	0.81	

Table F-4
Phase III Hydrocarbon Recovery Summary (Winter 1994)

Well ID	05-MW-04	05-RW-2	05-W-2	05-MW-07	06-MW-04
Initial Measurements					
Original Product Level	27.77	27.93	28.42	30.33	25.09
Original Water Level	30.20	30.20	31.14	30.93	26.93
Original Product Thickness	2.43	2.27	2.72	0.60	1.84
Original Volume (gal.)	0.39	3.33	0.43	0.10	0.29
Recovery Results					
Time = 0 Thickness	0.15	0.41	0.92	0.00	0.11
1-Hour Thickness	0.66 (27.2%)	1.04 (45.8%)	2.50 (91.9%)	0.02 (3.3%)	0.97 (52.7%)
6-Hour Thickness	1.88 (77.4%)	1.68 (74.0%)	2.52 (92.6%)	0.07 (11.7%)	1.14 (62.0%)
12-Hour Thickness	2.23 (91.8%)	1.92 (84.6%)	2.4 (88.2%)	0.2 (33.3%)	Not measured
30-Hour Thickness	Not measured	2.00 (88.1%)	Not measured	Not measured	Not measured
48-Hour Thickness	Not measured	2.18 (96.0%)	Not measured	Not measured	Not measured
Estimated Formation Thickness	0.49	0.45	0.54	0.16	0.37
Skimming Results					
Well Skimmed?	No	Yes	No	No	No
Recovered Volume (gal.)	---	4.68 (141%)	---	---	---

Note: All results in feet unless noted otherwise"

Figure 1
Baildown Test

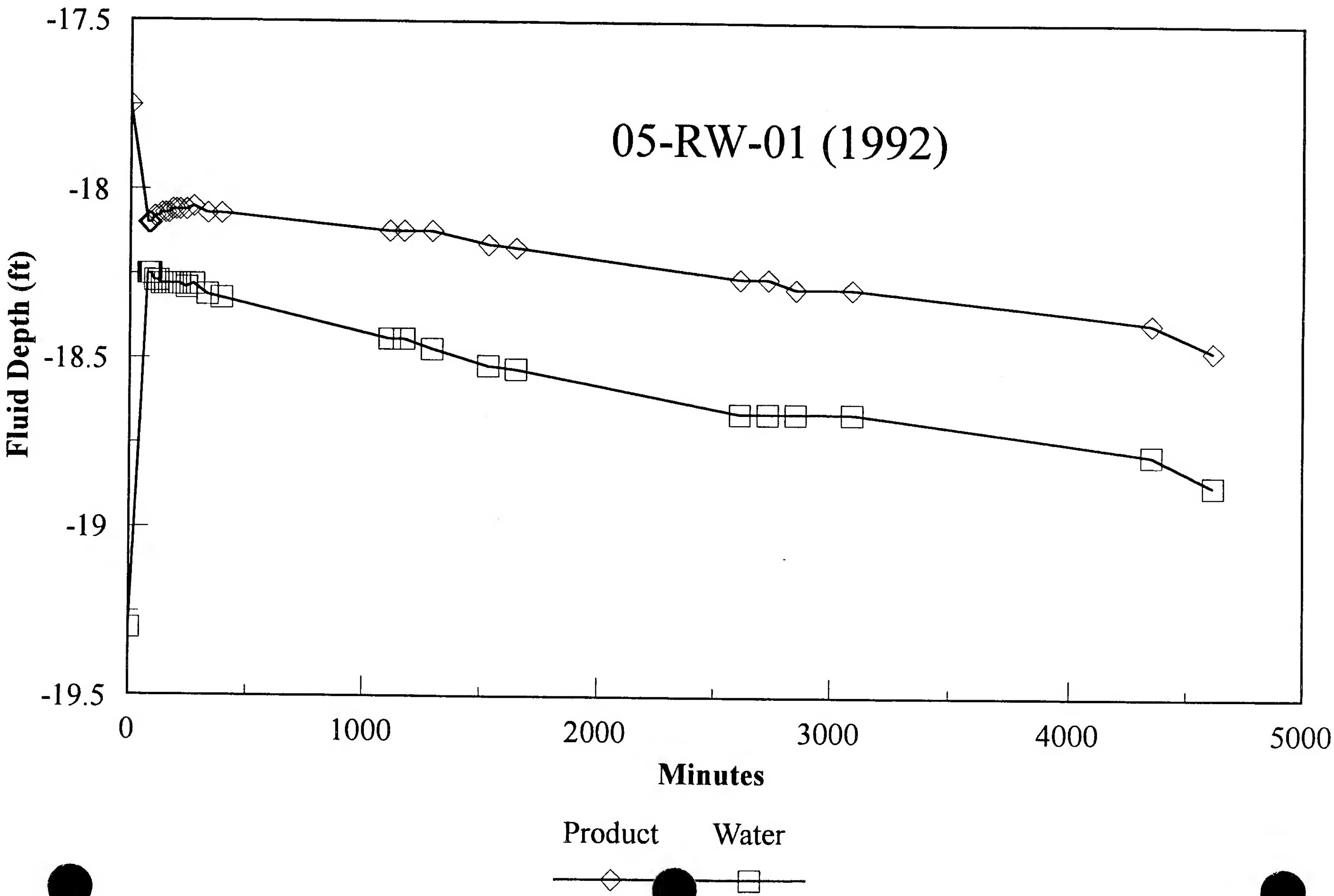


Figure 2
Baildown Test

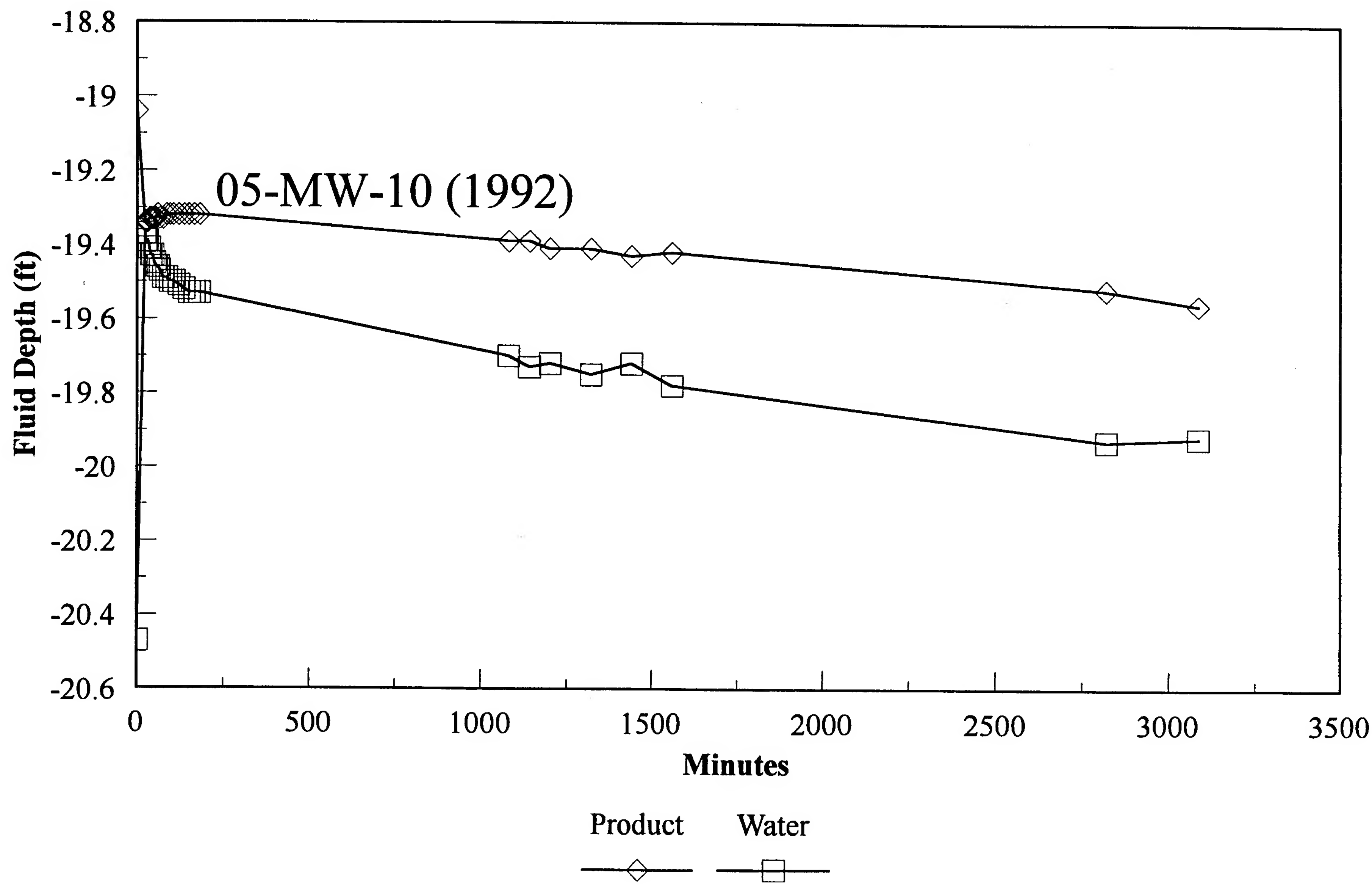
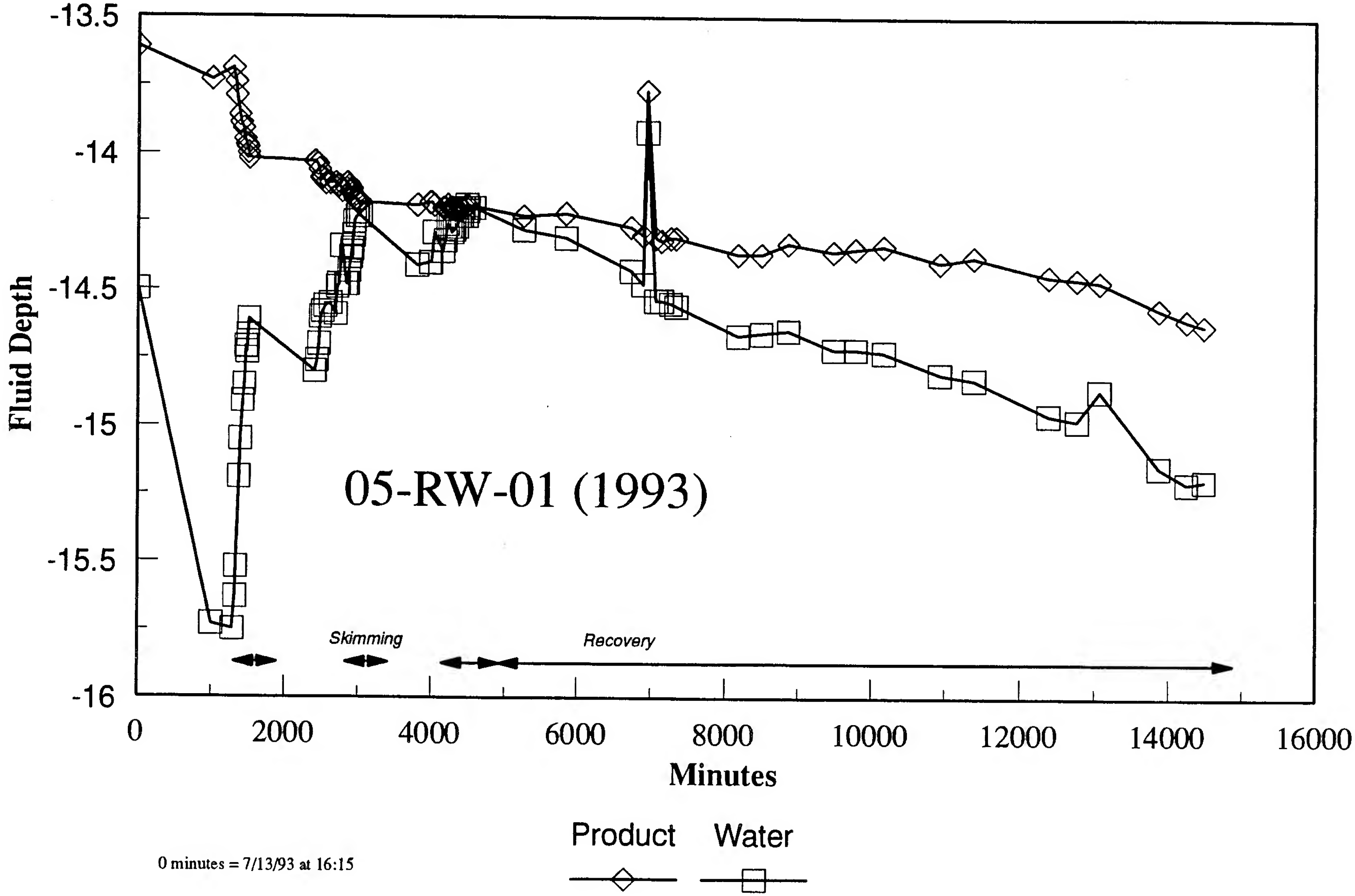


Figure 3

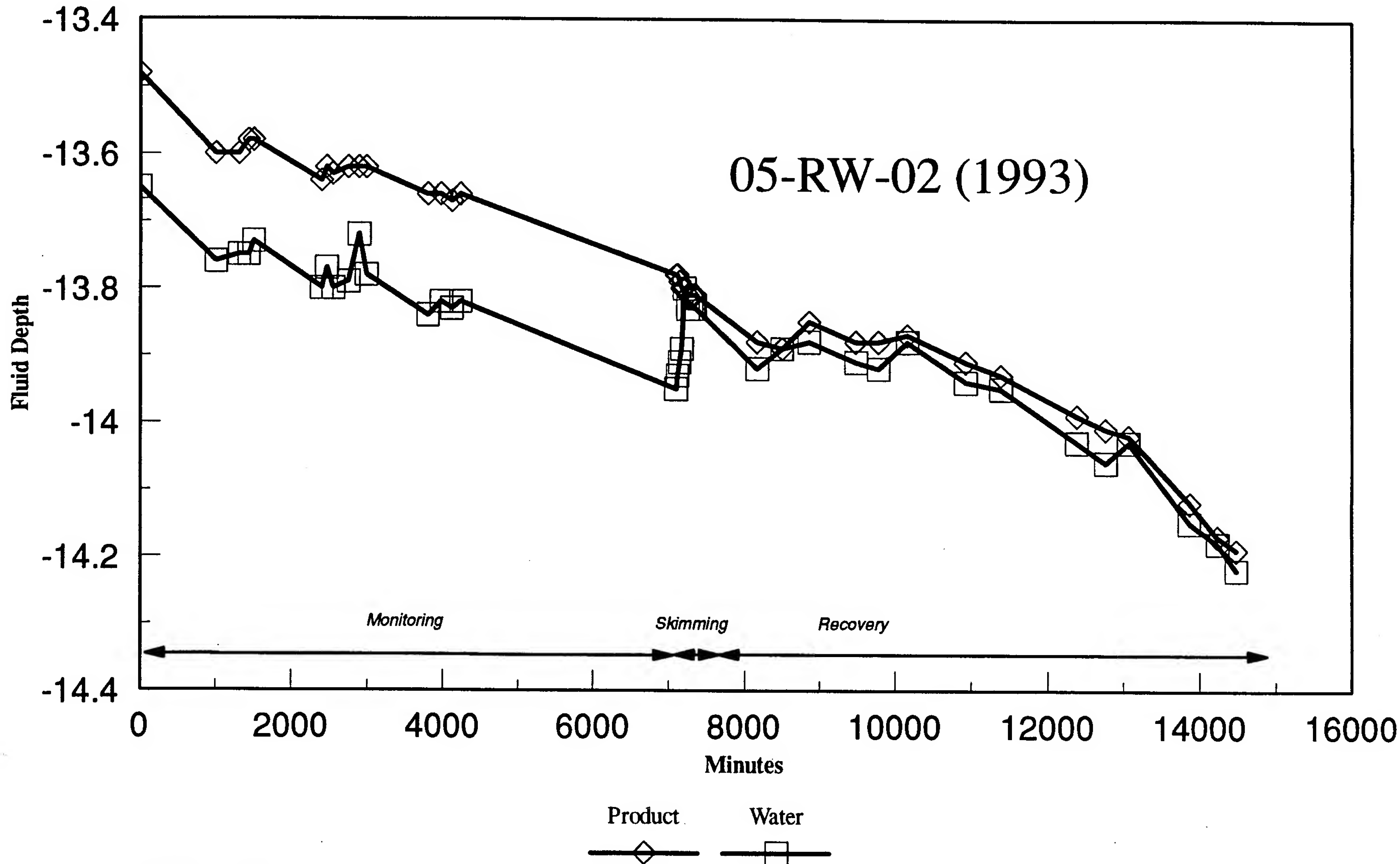
Baildown Testing and Skimming Results



0 minutes = 7/13/93 at 16:15

Figure 4

Baildown Testing and Skimming Results



0 minutes = 7/13/93 at 1615

Figure 5

Baildown Testing and Skimming Results

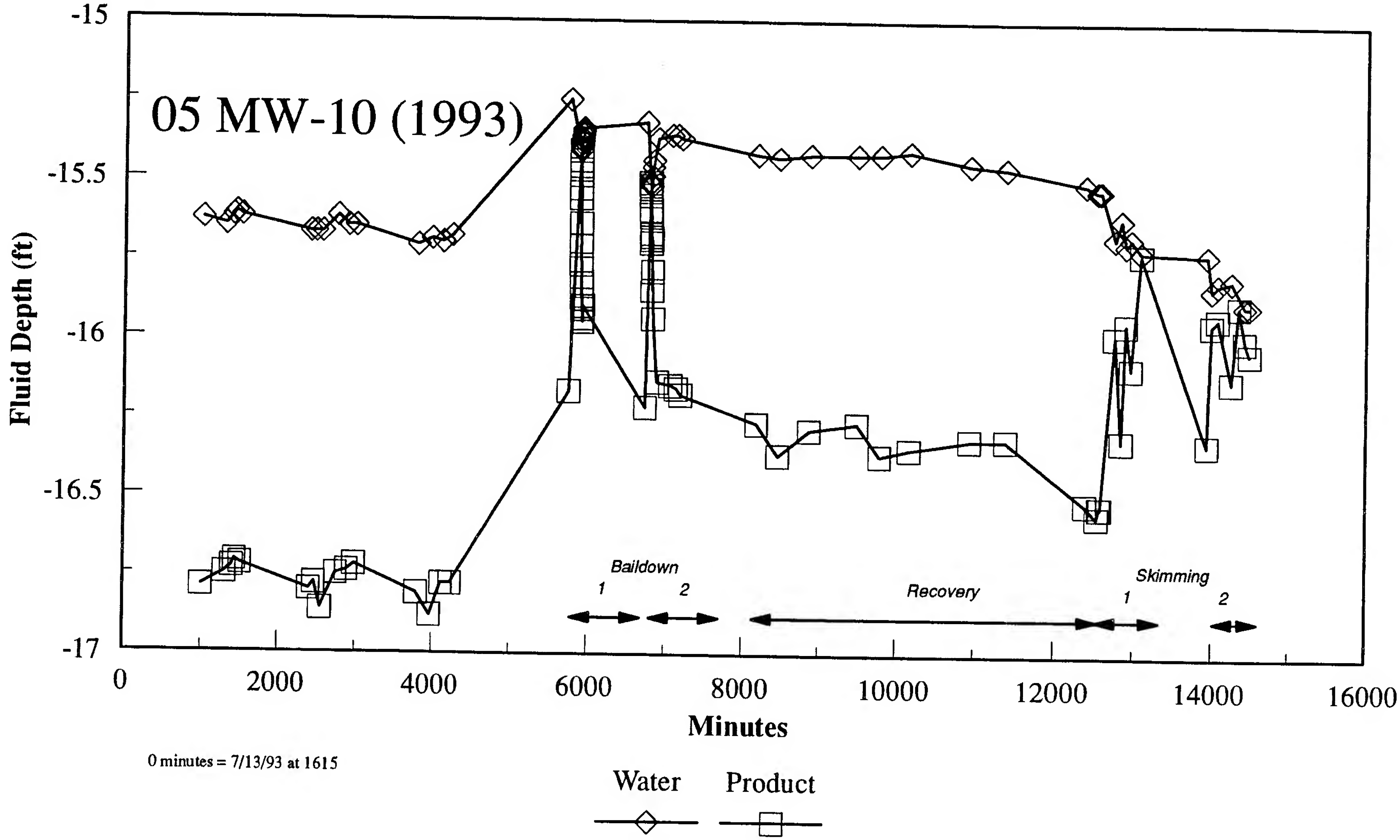


Figure 6

Baildown Testing and Skimming Results

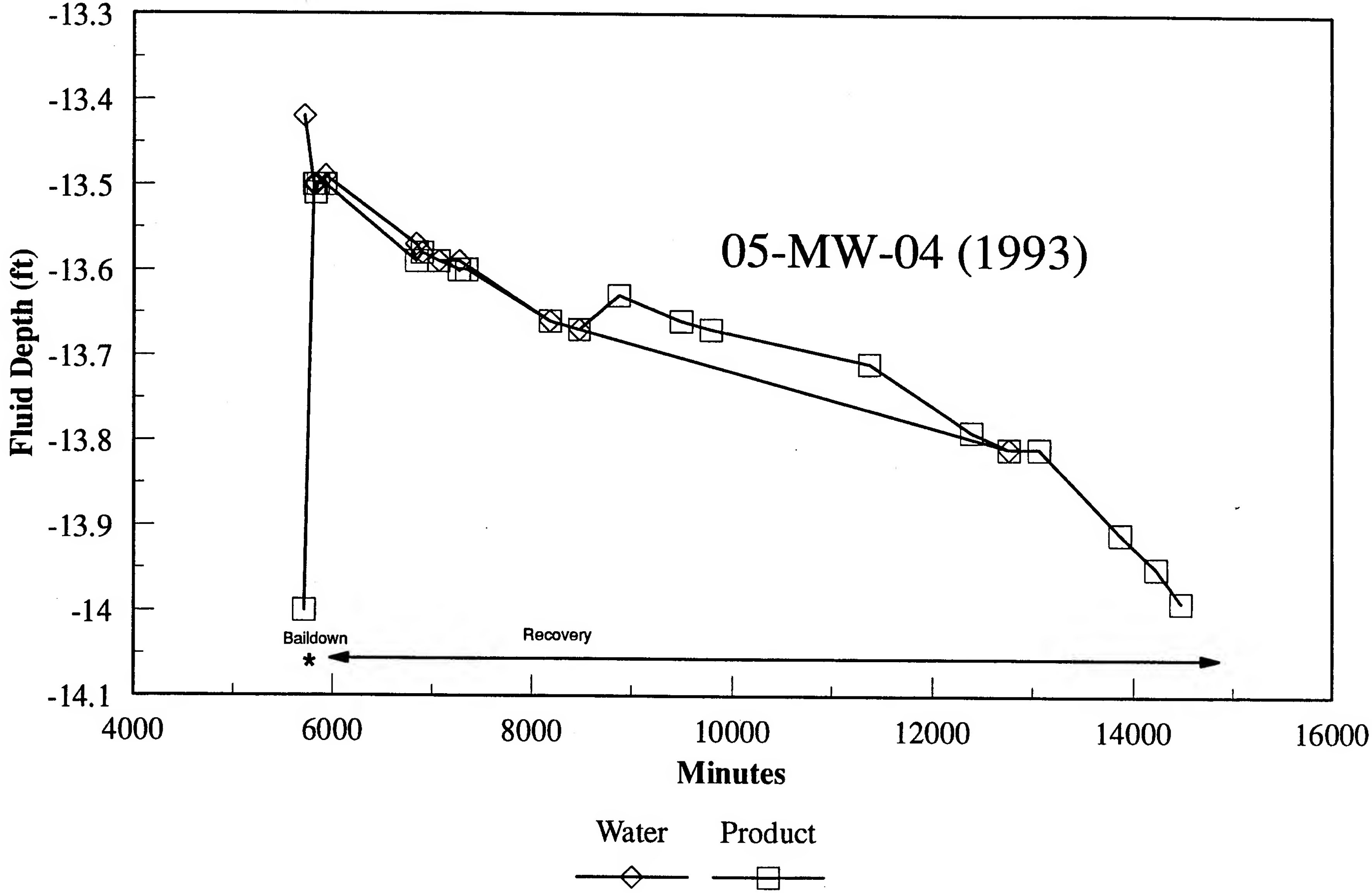
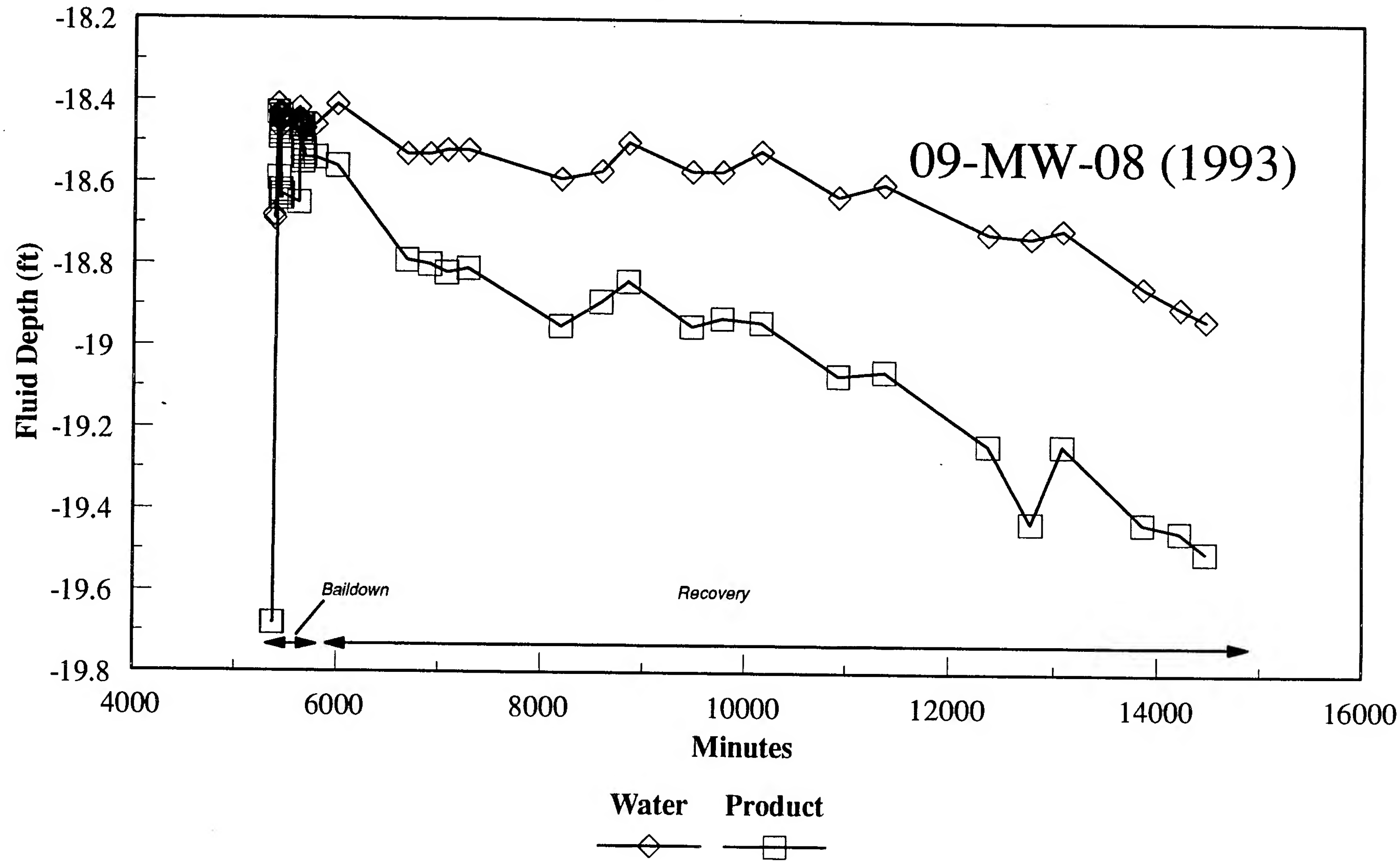


Figure 7

Baildown Testing and Skimming Results



GALENA AFS

HYDROCARBON RECOVERY TESTING

05-RW-1

Baildown Test: Hydrocarbon Recovery Well

Date	Time	Elapsed Time (min)	Product Level (feet)	Water Level (feet)	Product Thickness (feet)
09/17/92	13:00	0	17.75	19.3	1.55
09/17/92	14:15	76	18.1	18.25	0.15
09/17/92	14:19	80	18.1	18.25	
09/17/92	14:24	85	18.1	18.25	
09/17/92	14:30	90	18.1	18.25	
09/17/92	14:44	105	18.08	18.27	0.19
09/17/92	15:00	120	18.08	18.27	
09/17/92	15:15	135	18.07	18.28	0.21
09/17/92	15:29	150	18.07	18.28	
09/17/92	15:45	165	18.07	18.28	
09/17/92	16:00	180	18.06	18.28	0.22
09/17/92	16:14	195	18.06	18.28	
09/17/92	16:30	210	18.06	18.28	
09/17/92	16:59	240	18.06	18.29	0.23
09/17/92	17:30	270	18.05	18.28	
09/17/92	18:30	330	18.07	18.31	0.24
09/17/92	19:30	390	18.07	18.32	
09/18/92	07:30	1110	18.12	18.44	0.32
09/18/92	08:30	1170	18.12	18.44	
09/18/92	10:30	1290	18.12	18.47	0.35
09/18/92	14:30	1530	18.16	18.52	0.36
09/18/92	16:30	1650	18.17	18.53	
09/19/92	08:30	2610	18.26	18.66	0.4
09/19/92	10:30	2730	18.26	18.66	
09/19/92	12:29	2850	18.29	18.66	
09/19/92	16:30	3090	18.29	18.66	
09/20/92	13:30	4350	18.39	18.78	
09/20/92	17:55	4615	18.47	18.87	

Site 5 Recovery Well 1

Date	Time	Baseline	Product Height	Water Height	Product Thickness	Pump		Comments
13-Jul-93	1620	5	-13.61	-14.5	0.89			
14-Jul-93	900	1005	-13.73	-15.73	2.00			
	Began Skimming					On	Off	
	1346	1291	-13.69	-15.75	2.06	2	0	
	1419	1324	-13.74	-15.63	1.89			
	1432	1337	-13.79	-15.52	1.73			
	1515	1380	-13.86	-15.19	1.33	1	20	Replaced Batteries in Probe
	1530	1395	-13.89	-15.05	1.16			
	1603	1428	-13.91	-14.91	1.00			
	1625	1450	-13.95	-14.85	0.90			
	1647	1472	-13.97	-14.71	0.74			
	1701	1486	-13.98	-14.73	0.75			
	1714	1499	-14	-14.67	0.67			
	1728	1513	-14.02	-14.61	0.59			
15-Jul-93	815	2400	-14.03	-14.8	0.77			
	Began Skimming							
	820	2405	-14.03	-14.8	0.77	1	40	
	851	2436	-14.04	-14.76	0.72	1	50	
	916	2461	-14.06	-14.7	0.64			
	934	2479	-14.09	-14.6	0.51			
	1005	2510	-14.09	-14.58	0.49			
	1042	2547	-14.11	-14.56	0.45			
	1150	2615	-14.11	-14.55	0.44			Skimmer Lowered at 1104
	1300	2685	-14.11	-14.59	0.48			Compressor Motor Overheating
	1326	2711	-14.12	-14.49	0.37			
	1343	2728	-14.12	-14.48	0.36			
	1425	2770	-14.14	-14.34	0.20			
	1520	2825	-14.13	-14.48	0.35			Compressor Motor Overheating
	1530	2835	-14.11	-14.48	0.37			
	1540	2845	-14.11	-14.48	0.37			
	1600	2865	-14.12	-14.43	0.31			
	1622	2887	-14.14	-14.38	0.24			
	1631	2896	-14.13	-14.36	0.23			
	1642	2907	-14.15	-14.35	0.20			
	1703	2928	-14.16	-14.3	0.14			
	1716	2941	-14.17	-14.25	0.08			
	1746	2971	-14.17	-14.23	0.06			
	1758	2983	-14.18	-14.23	0.05			

	1835	3020	-14.18	-14.23	0.05			
16-Jul-93	730	3795	-14.19	-14.41	0.22			
	1025	3970	-14.18	-14.4	0.22			
	Began Skimming							
	1038	3983	-14.18	-14.4	0.22	1.5	180	
	1120	4025	-14.19	-14.29	0.10			
	1322	4147	-14.2	-14.36	0.16			
	1352	4177	-14.2	-14.32	0.12			
	1423	4208	-14.19	-14.26	0.07	1.5	135	
	1452	4237	-14.2	-14.27	0.07			
	1521	4266	-14.2	-14.29	0.09			
	1551	4296	-14.2	-14.28	0.08			
	1622	4327	-14.2	-14.27	0.07			
	1705	4370	-14.2	-14.23	0.03			
	1731	4396	-14.2	-14.23	0.03			
	1800	4425		-14.2	0.00	5	30	
	1835	4460	-14.2	-14.23	0.03			
	1845	4470	-14.19	-14.19	0.00			
	Begin Baildown Test							
	1853	4478	-14.21	-14.21	0.00			
	1854	4479	-14.2	-14.2	0.00			
	1855	4480	-14.2	-14.2	0.00			
	1857	4482	-14.21	-14.21	0.00			
	1858	4483	-14.21	-14.21	0.00			
	1859	4484	-14.2	-14.2	0.00			
	1900	4485	-14.2	-14.2	0.00			
	1901	4486	-14.2	-14.2	0.00			
	1902	4487	-14.2	-14.2	0.00			
	1903	4488	-14.2	-14.2	0.00			
	2023	4568	-14.2	-14.2	0.00			
					0.00			
17-Jul-93	743	5248	-14.23	-14.28	0.05			
	1729	5834	-14.22	-14.31	0.09			
18-Jul-93	820	6725	-14.27	-14.43	0.16			
	1103	6888	-14.3	-14.48	0.18			
	1155	6940	-13.77	-13.92	0.15			
	1353	7058	-14.31	-14.54	0.23			
	1510	7135	-14.32	-14.54	0.22			
	1713	7258	-14.31	-14.55	0.24			
	1825	7330	-14.31	-14.56	0.25			
19-Jul-93	825	8170	-14.37	-14.67	0.30			

	1345	8490	-14.37	-14.66	0.29		
	1955	8860	-14.33	-14.65	0.32		
20-Jul-93	618	9483	-14.36	-14.72	0.36		
	1118	9783	-14.35	-14.72	0.37		
	1738	10163	-14.34	-14.73	0.39		
21-Jul-93	622	10927	-14.4	-14.81	0.41		
	1400	11385	-14.38	-14.83	0.45		
22-Jul-93	637	12382	-14.45	-14.96	0.51		
	1257	12762	-14.46	-14.98	0.52		
	1800	13065	-14.47	-14.87	0.40		
23-Jul-93	721	13866	-14.57	-15.15	0.58		
	1340	14245	-14.61	-15.21	0.60		
	1737	14482	-14.63	-15.2	0.57		

GALENA AFS

HYDROCARBON RECOVERY TESTING

05-RW-2

Site 5 Recovery Well 2

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump On	Pump Off	Comments
13–Jul–93	1615	0	−13.48	−13.65	0.17			
14–Jul–93	900	1005	−13.6	−13.76	0.16			
	1407	1312	−13.6	−13.75	0.15			
	1615	1440	−13.58	−13.75	0.17			
	1720	1505	−13.58	−13.73	0.15			
15–Jul–93	815	2400	−13.64	−13.8	0.16			
	922	2467	−13.62	−13.77	0.15			
	1045	2550	−13.63	−13.8	0.17			
	1405	2750	−13.62	−13.79	0.17			
	1625	2890	−13.62	−13.72	0.10			
	1800	2985	−13.62	−13.78	0.16			
16–Jul–93	730	3795	−13.66	−13.84	0.18			
	1025	3970	−13.66	−13.82	0.16			
	1248	4113	−13.67	−13.83	0.16			
	1445	4230	−13.66	−13.82	0.16			
Begin Skimming								
18–Jul–93	1435	7100	−13.78	−13.95	0.17	1	120	
	1450	7115	−13.78	−13.93	0.15			
	1515	7140	−13.79	−13.91	0.12			
	1545	7170	−13.8	−13.89	0.09			
	1620	7205	−13.8	−13.8	0.00	1	195	
	1705	7250	−13.81	−13.83	0.02	2	90	
	1756	7301	−13.81	−13.83	0.02			
	1820	7325	−13.81	−13.83	0.02	2	75	
	1840	7345	−13.81	−13.83	0.02	1	60	
Began Baildown								
19–Jul–93	821	8166	−13.88	−13.92	0.04			
	1350	8495	−13.89	−13.89	0.00			
	1950	8855	−13.85	−13.88	0.03			

Site 5 Recovery Well 2

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comments
20–Jul–93	615	9480	–13.88	–13.91	0.03		
	1115	9780	–13.88	–13.92	0.04		
	1735	10160	–13.87	–13.88	0.01		
21–Jul–93	620	10925	–13.91	–13.94	0.03		
	1357	11382	–13.93	–13.95	0.02		
22–Jul–93	635	12380	–13.99	–14.03	0.04		
	1255	12760	–14.01	–14.06	0.05		
	1755	13060	–14.02	–14.03	0.01		
23–Jul–93	718	13863	–14.12	–14.15	0.03		
	1329	14234	–14.17	–14.18	0.01		
	1734	14479	–14.19	–14.22	0.03		

GALENA AFS

HYDROCARBON RECOVERY TESTING

05-MW-04

Site 5 Monitoring Well 4

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comments
17–Jul–93	1530	5715	−13.42	−14	0.58		
Begin Baildown							
	1701	5806	−13.5	−13.5	0.00		
	1702	5807	−13.5	−13.5	0.00		
	1703	5808	−13.5	−13.5	0.00		
	1705	5810		−13.5			
	1708	5813	−13.5	−13.5	0.00		
	1711	5816		−13.5			
	1719	5824	−13.5	−13.51	0.01		
	1725	5830	−13.5	−13.51	0.01		
	1744	5849		−13.5			
	1901	5926	−13.49	−13.5	0.01		
18–Jul–93	1014	6839	−13.57	−13.59	0.02		
	1110	6895	−13.58	−13.58	0.00		
	1358	7063	−13.59	−13.59	0.00		
	1720	7265	−13.59	−13.60	0.01		
	1835	7340		−13.60			
19–Jul–93	835	8180	−13.66	−13.66	0.00		
	1330	8475	−13.67	−13.67	0.00		
	2010	8875		−13.63			
20–Jul–93	625	9490		−13.66			
	1123	9788		−13.67			
	1745	10170	−13.98	−13.98	0.00		
21–Jul–93	630	10935		−14.70			
	1349	11374		−13.71			
22–Jul–93	645	12390		−13.79			
	1301	12766	−13.81	−13.81	0.00		
	1803	13068		−13.81			

Site 5 Monitoring Well 4

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comments
23–Jul–93	724	13869		–13.91			
	1320	14225		–13.95			
	1730	14475		–13.99			

GALENA AFS

HYDROCARBON RECOVERY TESTING

05-MW-10

Baildown Test: 05-MW-10

Date	Time	Elapsed Time (min)	Product Level (feet)	Water Level (feet)	Product Thickness (feet)
09/18/92	14:30	0	19.04	20.47	1.43
09/18/92	14:53	23	19.34	19.37	0.03
09/18/92	14:55	25	19.34	19.39	
09/18/92	14:57	28	19.34	19.39	
09/18/92	15:00	30	19.34	19.39	
09/18/92	15:04	35	19.33	19.41	
09/18/92	15:09	40	19.33	19.43	0.1
09/18/92	15:15	45	19.33	19.43	
09/18/92	15:20	50	19.33	19.45	
09/18/92	15:24	55	19.33	19.46	
09/18/92	15:29	60	19.32	19.46	
09/18/92	15:35	65	19.33	19.47	
09/18/92	15:45	75	19.33	19.49	
09/18/92	15:54	85	19.32	19.49	
09/18/92	16:05	95	19.32	19.5	
09/18/92	16:14	105	19.32	19.5	
09/18/92	16:30	120	19.32	19.51	
09/18/92	16:45	135	19.32	19.52	0.2
09/18/92	16:59	150	19.32	19.53	
09/18/92	17:15	165	19.32	19.53	
09/18/92	17:30	180	19.32	19.53	
09/19/92	08:30	1080	19.39	19.7	0.31
09/19/92	09:29	1140	19.39	19.73	
09/19/92	10:30	1200	19.41	19.72	
09/19/92	12:29	1320	19.41	19.75	
09/19/92	14:30	1440	19.43	19.72	
09/19/92	16:30	1560	19.42	19.78	
09/20/92	13:30	2820	19.52	19.93	0.41
09/20/92	17:55	3085	19.56	19.92	

Site 5 Monitoring Well 10

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comments
14-Jul-93	900	1005	-15.63	-16.79	1.16		
	1403	1308	-15.65	-16.75	1.10		
	1535	1400	-15.62	-16.73	1.11		
	1611	1436	-15.61	-16.71	1.10		
	1725	1510	-15.62	-16.72	1.10		
15-Jul-93	815	2400	-15.67	-16.8	1.13		
	922	2467	-15.67	-16.78	1.11		
	1045	2550	-15.67	-16.86	1.19		
	1405	2750	-15.62	-16.75	1.13		
	1625	2890	-15.65	-16.74	1.09		
	1800	2985	-15.65	-16.72	1.07		
16-Jul-93	730	3795	-15.71	-16.81	1.10		
	1025	3970	-15.69	-16.88	1.19		
	1250	4115	-15.7	-16.78	1.08		
	1450	4235	-15.68	-16.78	1.10		
17-Jul-93	1605	5750	-15.25	-16.17	0.92		
Begin Baildown							
	1821	5886	-15.41	-15.41	0.00		
	1823	5887.5	-15.41	-15.44	0.03		
	1823	5888	-15.41	-15.47	0.06		
	1824	5889	-15.4	-15.53	0.13		
	1825	5890	-15.41	-15.56	0.15		
	1828	5892.5	-15.39	-15.64	0.25		
	1830	5894.5	-15.38	-15.71	0.33		
	1831	5896	-15.38	-15.77	0.39		
	1834	5899	-15.37	-15.83	0.46		
	1836	5901	-15.38	-15.88	0.50		
	1840	5905	-15.37	-15.9	0.53		
	1844	5908.5	-15.36	-15.91	0.55		
	1846	5911	-15.35	-15.95	0.60		
	1849	5914	-15.35	-15.94	0.59		

Site 5 Monitoring Well 10

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comments
	1852	5917	−15.34	−15.95	0.61		
	1855	5920	−15.34	−15.9	0.56		
18−Jul−93	830	6735	−15.32	−16.22	0.90		
Repeat Baildown							
	915	6780	−15.51	−15.51	0.00		
	916	6781	−15.51	−15.51	0.00		
	916.5	6781.5	−15.51	−15.51	0.00		
	917	6782	−15.51	−15.52	0.01		
	917.5	6782.5	−15.51	−15.51	0.00		
	918	6783	−15.51	−15.52	0.01		
	918.5	6783.5	−15.51	−15.51	0.00		
	919	6784	−15.51	−15.51	0.00		
	919.5	6784.5	−15.51	−15.52	0.01		
	920	6785	−15.51	−15.52	0.01		
	921	6786	−15.51	−15.55	0.04		
	922	6787	−15.51	−15.53	0.02		
	923	6788	−15.51	−15.53	0.02		
	924	6789	−15.51	−15.6	0.09		
	925	6790	−15.51	−15.6	0.09		
	927	6792	−15.52	−15.61	0.09		
	929	6794	−15.51	−15.67	0.16		
	931	6796	−15.52	−15.69	0.17		
	933	6798	−15.52	−15.7	0.18		
	935	6800	−15.52	−15.68	0.16		
	940	6805	−15.49	−15.69	0.20		
	945	6810	−15.49	−15.85	0.36		
	950	6815	−15.46	−15.79	0.33		
	1000	6825	−15.44	−15.94	0.50		
	1058	6883	−15.37	−16.14	0.77		
	1350	7055	−15.36	−16.15	0.79		
	1504	7129	−15.36	−16.16	0.80		
	1600	7185	−15.37	−16.18	0.81		

Site 5 Monitoring Well 10

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump On	Pump Off	Comments
19–Jul–93	827	8172	−15.42	−16.27	0.85			
	1310	8455	−15.43	−16.37	0.94			
	2000	8865	−15.42	−16.29	0.87			
20–Jul–93	620	9485	−15.42	−16.27	0.85			
	1120	9785	−15.42	−16.37	0.95			
	1740	10165	−15.41	−16.35	0.94			
21–Jul–93	626	10931	−15.45	−16.32	0.87			
	1402	11387	−15.46	−16.32	0.86			
22–Jul–93	640	12385	−15.51	−16.52	1.01			
	905	12530	−15.53	−16.56	1.03			
	935	12560	−15.53	−16.53	1.00			
Begin Skimming						On	Off	
	950	12575	−15.53	−16.53	1.00	1	90	
	1015	12600				1	135	
	1245	12750	−15.68	−15.99	0.31			
	1305	12770				1	165	
	1410	12835	−15.62	−16.32	0.70	1.5	135	
	1505	12890	−15.7	−15.95	0.25	1.5	165	
	1610	12955	−15.68	−16.09	0.41	1.5	135	
	1820	13085	−15.72	−15.73	0.01			
23–Jul–93	830	13935	−15.73	−16.33	0.60	1.5	150	
	930	13995	−15.84	−15.95	0.11	1.5	165	
	1045	14070	−15.82	−15.93	0.11			
	1345	14250	−15.81	−16.13	0.32			
	1520	14345		−15.89				
	1635	14420	−15.89	−16	0.11			
	1740	14485	−15.89	−16.04	0.15			

GALENA AFS

HYDROCARBON RECOVERY TESTING

09-MW-08

Well ID: 09-MW-08

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comment
17-Jul-93	945	5370	-18.68	-19.68	1.00		
Begin Baildown							
	955	5380	-18.69	-19.68	0.99		
	1020	5405	-18.41	-18.43	0.02		
	1027	5412	-18.43	-18.59	0.16		
	1035.5	5420.5	-18.47	-18.49	0.02		
	1036	5421	-18.45	-18.48	0.03		
	1036.5	5421.5	-18.44	-18.62	0.18		
	1037	5422	-18.45	-18.47	0.02		
	1037.5	5422.5	-18.45	-18.46	0.01		
	1038	5423	-18.44	-18.47	0.03		
	1038.5	5423.5	-18.45	-18.47	0.02		
	1039	5424	-18.45	-18.62	0.17		
	1039.5	5424.5	-18.45	-18.64	0.19		
	1040	5425	-18.45	-18.63	0.18		
	1040.5	5425.5	-18.44	-18.64	0.20		
	1041	5426	-18.44	-18.63	0.19		
	1041.5	5426.5	-18.43	-18.64	0.21		
	1042	5427	-18.44	-18.64	0.20		
	1043	5428	-18.45	-18.46	0.01		
	1044	5429	-18.44	-18.48	0.04		
	1045	5430	-18.45	-18.63	0.18		
	1046	5431	-18.43	-18.44	0.01		
	1047	5432	-18.44	-18.45	0.01		
	1048	5433	-18.45	-18.62	0.17		
	1050	5435	-18.44	-18.62	0.18		
	1051	5436	-18.45	-18.62	0.17		
	1052	5437	-18.45	-18.63	0.18		
	1053	5438	-18.45	-18.64	0.19		
	1054	5439	-18.45	-18.63	0.18		
	1056	5441	-18.45	-18.64	0.19		
	1058	5443	-18.46	-18.63	0.17		
	1100	5445	-18.44	-18.64	0.20		
	1102	5447	-18.45	-18.64	0.19		

Well ID: 09-MW-08

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comment
	1104	5449	-18.45	-18.63	0.18		
	1346	5611	-18.42	-18.65	0.23		
Retry Baildown							
	1353.5	5618.5	-18.47	-18.48	0.01		
	1354	5619	-18.46	-18.47	0.01		
	1354.5	5619.5	-18.46	-18.47	0.01		
	1355	5620	-18.46	-18.47	0.01		
	1356	5621	-18.45	-18.46	0.01		
	1357	5622	-18.46	-18.47	0.01		
	1358	5623	-18.45	-18.46	0.01		
	1359	5624	-18.46	-18.47	0.01		
	1400	5625	-18.45	-18.46	0.01		
	1405	5630	-18.46	-18.47	0.01		
	1414	5639	-18.45	-18.52	0.07		
	1416.5	5641.5	-18.46	-18.52	0.06		
	1419	5644	-18.45	-18.46	0.01		
	1421	5646	-18.47	-18.55	0.08		
	1425	5650	-18.46	-18.51	0.05		
	1428	5653	-18.46	-18.53	0.07		
	1432	5657	-18.47	-18.54	0.07		
	1436	5661	-18.46	-18.52	0.06		
	1440	5665	-18.47	-18.54	0.07		
	1625	5770	-18.46	-18.54	0.08		
	2000	5985	-18.41	-18.56	0.15		
18-Jul-93	733	6678	-18.53	-18.79	0.26		
	1119	6904	-18.53	-18.8	0.27		
	1405	7070	-18.52	-18.82	0.30		
	1735	7280	-18.52	-18.81	0.29		
19-Jul-93	841	8186	-18.59	-18.95	0.36		
	1515	8580	-18.57	-18.89	0.32		
	1940	8845	-18.5	-18.84	[illegible]		

Well ID: 09-MW-08

Date	Time	(Baseline)	Prod. Ht.	Water Ht.	Prod. Th.	Pump	Comment
20-Jul-93	605	9470	-18.57	-18.95	0.38		
	1105	9770	-18.57	-18.93	0.36		
	1730	10155	-18.52	-18.94	0.42		
21-Jul-93	615	10920	-18.63	-19.07	0.44		
	1349	11374	-18.6	-19.06	0.46		
22-Jul-93	625	12370	-18.72	-19.24	0.52		
	1311	12776	-18.73	-19.43	0.70		
	1812	13077	-18.71	-19.24	0.53		
23-Jul-93	710	13855	-18.85	-19.43	0.58		
	1315	14220	-18.9	-19.45	0.55		
	1725	14470	-18.93	-19.5	0.57		

Results of Analysis for Free Product from the POL Tank Farm

RADIAN
CORPORATION

MEMORANDUM

TO: Mike McGhee, AFCEE/ESR

FROM: Mike Green

DATE: May 31, 1994

COPY: Wes Lannen, 11CEOS/CEVR

SUBJECT: Galena Airport - Analysis of Recovered Hydrocarbons

Please find the attached table of analytical results for a liquid sample collected from a drum of free-phase product which is currently being stored in the current Waste Accumulation Area (Bldg. 1488) at Galena Airport. This sample was collected and analyzed according to the instructions of Wes Lannen. The waste drum contains fluids recovered during baildown and skimming tests conducted during July, 1993 and April, 1994. The analyte list was selected by the 11CEOS.

Waste Drum Results (Sampled 4-19-94)

Analyte	TCLP Limit	Concentration/dl	
TCLP VOC's (mg/L)			
Benzene	0.5	2260	(164)
Carbon tetrachloride	0.5	ND	(362)
Chlorobenzene	100.0	ND	(252)
Chloroform	6.0	ND	(150)
1,2-Dichloroethane	0.5	ND	(355)
1,1-Dichloroethene	0.7	ND	(480)
Methyl ethyl ketone	200.0	690	(690)
Tetrachloroethene	0.7	ND	(365)
Trichloroethene	0.5	ND	(390)
Vinyl chloride	0.2	ND	(308)
TCLP SVOC's (mg/L)*			
1,4-Dichlorobenzene	7.5	ND X	(707)
2,4-Dinitrotoluene	0.13	ND X	(769)
Hexachlorobenzene	0.13	ND X	(528)
Hexachlorobutadiene	0.5	ND X	(657)
Hexachloroethane	3.0	ND X	(1000)
4-Methylphenol/3-Methylphen	200.0	ND X	(1240)
2-Methylphenol	200.0	ND X	(790)
Nitrobenzene	2.0	ND X	(389)
Pentachlorophenol	100.0	ND X	(192)
Pyridine	5.0	ND X	(1800)
2,4,5-Trichlorophenol	400.0	ND X	(586)
2,4,6-Trichlorophenol	2.0	ND X	(485)
TCLP Metals (mg/kg)			
Arsenic, SW6010	5.0	0.2	
Barium, SW6010	100.0	0.00649	
Cadmium, SW6010	1.0	<0.0171	
Chromium, SW6010	5.0	<0.0162	
Lead, SW6010	5.0	4.93	
Silver, SW6010	5.0	<0.0109	
Selenium, SW7740	1.0	0.466	
Mercury, SW7471	0.2	0.099	
Total Chlorine (mg/kg)	-	ND	(1320)
Ignitability (deg. F)	-	76.0	

X--Analyzed at lowest dilution possible due to sample matrix effects.

*-- Reported in mg/kg and converted to mg/L.

APPENDIX G

Geophysics and Soil Gas Reports

Geophysics Report

TABLE OF CONTENTS

LIST OF FIGURES

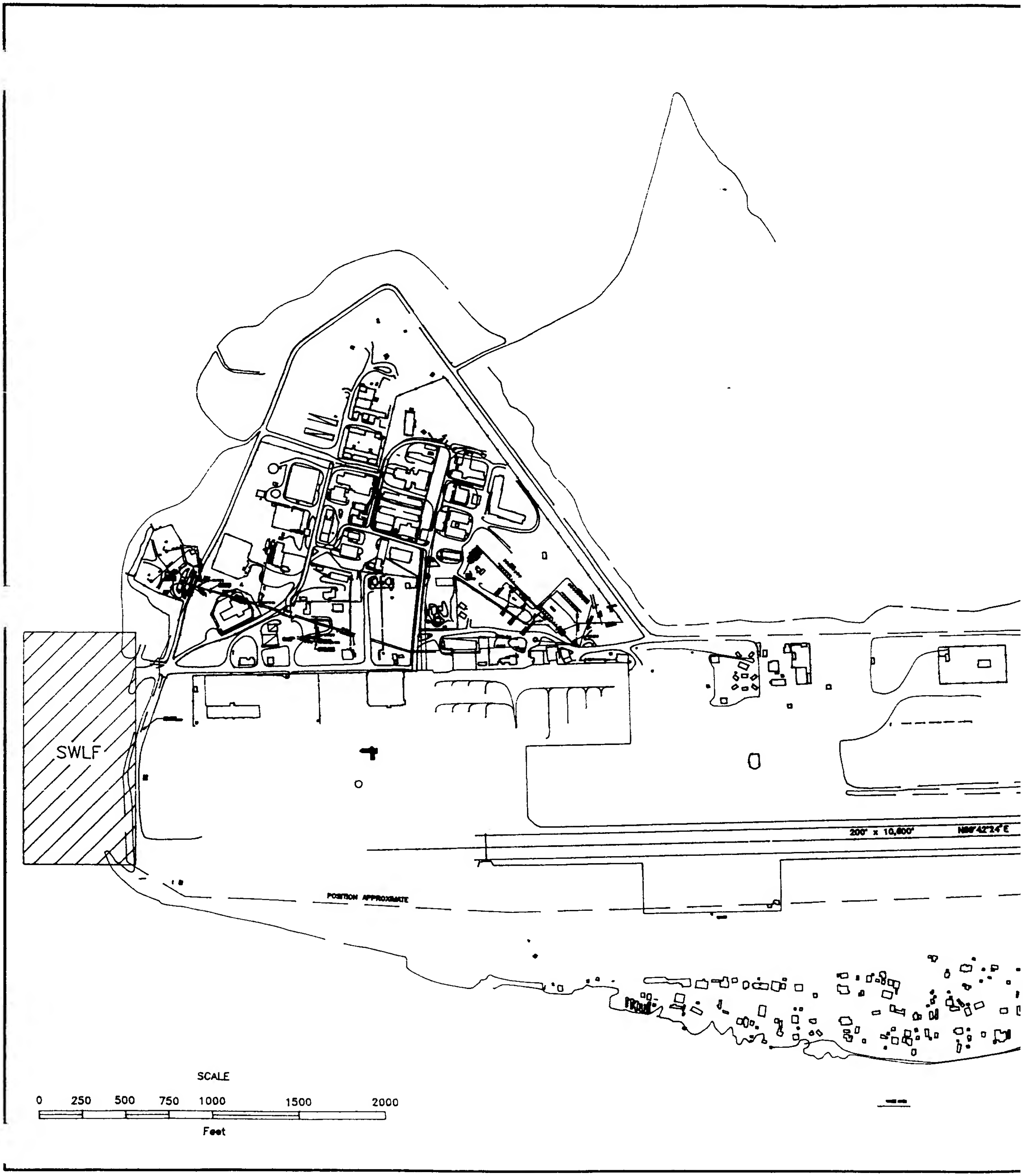
LIST OF FIGURES

1.0 Introduction

Geophysical surveys utilizing both ground penetrating radar (GPR) and induction electromagnetic methods (EM) were performed at four sites at the Galena Air Force Station between 25-July 1993 and 9-August 1993. These surveys were carried out to address two objectives. First, GPR and EM were utilized at the Fire Training Area (FTA) and the Ambient Site to determine the depth to permafrost. Second, EM and GPR data were used to identify potential buried hazards at two sites identified as areas of waste disposal, the Southwest Landfill and the Alternate Landfill. The data from all sites were analyzed in the field and used to guide subsequent soil gas/groundwater field screening sample collection.

The FTA is located north of the east end of the runway inside of the perimeter dike and has been used to train fire fighters. The Ambient Site is located due east of the FTA in a baseball park used for the Galena community. This area was investigated to establish background as the area has not been used for base operations. The Alternate Landfill Site is located north of the former runway radar tower on the north side of the dike road. This site has served as a landfill for solid waste when access to the active landfill was not possible. Initially it was believed that a small dumping pit was located adjacent to the outer dike road and the Yukon River, southwest of the western end of the runway. This site was designated the Southwest Landfill Area. After discussions with local persons familiar with the Southwest Landfill, it was apparent that the entire area west of the runway may have been used for disposal. Figure 1-1 shows the locations of all four of the sites on a map of the Galena area.

This report discusses the methods and results of the geophysical surveys, and presents recommendations for future action to assist in subsequent field efforts. This document discusses general data collection theory, instrument parameters and field methods for the entire site.



SWLF
200' x 10,600'
POSITION APPROXIMATE
SCALE
0
250
500
750
1000
1500
2000
Feet

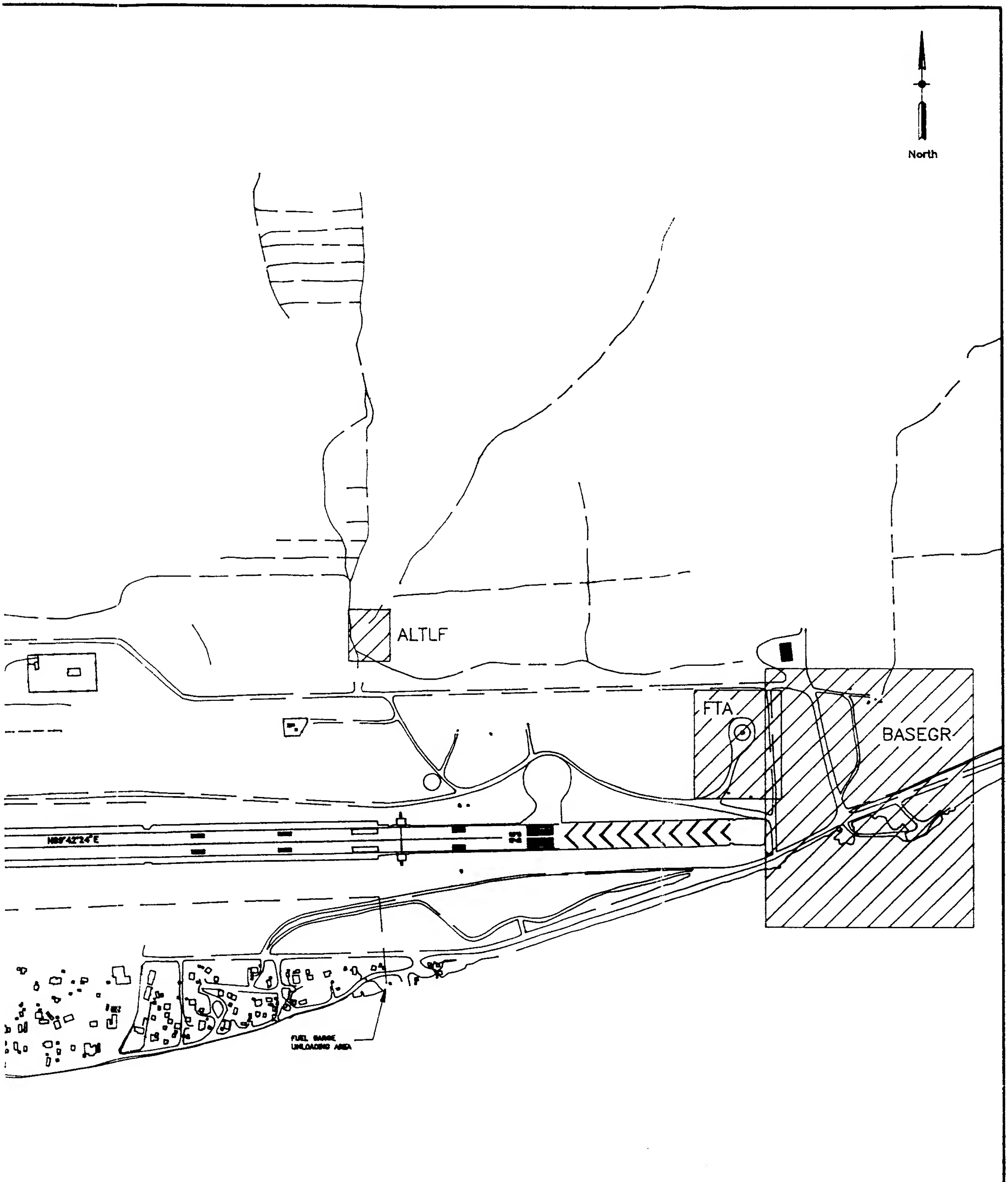


Figure 1-1. Locations of Geophysical Surveys

2.0 Investigation Background and Methodology

Two geophysical instruments were used at the Galena AFS sites. A Sensors and Software, Inc. PulseEkko IV instrument was used for the collection of the GPR data and a Geonics EM-31 terrain conductivity meter was used to collect the conductivity data. Both tools were used at all investigation sites. At the Ambient and FTA Sites, radar data were collected initially, followed by the EM-31 data. At the Alternate Landfill Site and the West Landfill Site, the EM-31 was used first to locate potential anomalies, followed by GPR to determine the boundaries and depths of these anomalies.

2.1 Ground Penetrating Radar

GPR works by transmitting a radar impulse of a selected bandwidth into the ground via a transmitter, and receiving a reflected signal back from objects/strata in the subsurface. The strength of the reflected signal and the delay for its return vary with the electrical properties and depth of the reflectors. These readings are displayed as a graph of signal intensity on a profile with horizontal locations along the X axis and time along the Y axis. The time axis can be converted to depth using approximate velocities of the travel time of the radar wave in the soil. Using several profiles collected across a subsurface feature or anomaly, a contour map of this feature can be created.

The frequency of radar antennae used determine both the resolution of the survey and the depth of penetration. In general, the higher the antenna frequency the shallower the depth of resolution. Three antenna frequencies were available for use at Galena, 50 megahertz (MHz), 100 MHz, and 200 MHz. The antenna were chosen for each site depending on what depth of investigation was desired.

The GPR equipment used at the Galena AFS consisted of several components. The Sensors and Software GPR consists of separate transmitting and receiving antennae which can be moved independently of each other or in tandem. These antennae

are attached to PVC handles, which also carry the transmitter and receiver assembly. These are attached to a control box datalogger and a 12-volt battery which were pulled behind the radar antennae in a small cart.

Having the transmitting and receiving antennae separated allows the system to be "tuned" for various frequencies and depths. For each frequency of antenna, various spacings between the transmitting and receiving antennae can be tried to determine which gives the best resolution.

In the field, the datalogger displays the radar data as they are being collected. The data can be reviewed on a screen during collection in order to verify that the instrument is working properly and that data are being recorded. In addition, the datalogger automatically writes the data to a disk so it can be used for more advanced signal processing at a later date.

Data Display

GPR data are normally displayed with horizontal location along the X axis and time along the Y axis. This time data can be converted to depth if the proper velocities of the propagated wave through the soil are known. The displays presented in this report were generated using proprietary display routines developed for the commercial software MATLAB®. The "depths" are given as two-way travel times to the event in nanoseconds (ns) with an estimation of the true depth in parentheses. An average velocity of .225 feet/ns (two-way travel time) was assumed for the soil velocity at Galena. Using this velocity, each 100 ns in time represents about 11 feet in depth.

Equipment Setup and Methods of Data Collection

Prior to running the actual surveys, several test lines were run at the FTA to determine which antenna frequency would give the best resolution and depth of penetration.

The initial survey lines indicated that the 100 MHz antenna would be sufficient for resolution of the subsurface in the first 15 feet and that the 50 MHz antenna would be used to achieve deeper depths of penetration. A spacing of 5 feet between the 50 MHz antennae and 3 feet between the 100 MHz antenna was determined to give the best resolution for each of the two frequencies used.

Since the target depth at the FTA was the deep permafrost, the 50 MHZ antennae were used. The 50 MHz antennae would allow for the deepest penetration of the radar signal. At the Alternate Landfill and the West Landfill Sites where resolution of shallower features was desired, the 100 megahertz antennae were used to define the lower boundaries of the landfills and the depths to any potential anomalies.

After the proper antenna spacing and trace-to-trace spacing was established, the survey lines were located. The results section describes the locations of the survey lines for each area. The collection of the GPR data was done in the following manner:

- Stretch out a cloth or fiberglass tape along the length of the GPR line to be collected;
- Collect the data by moving the GPR antenna along the tape in 1-foot increments, and
- Move the tape and collect the next line.

At the end of each day, the GPR data were downloaded from the datalogger on to 3.5" computer disks and reviewed for quality of data and potential anomalies.

2.2 Electromagnetic Survey

The EM instrument measures the ground conductivity by inducing a magnetic field into the ground by running an alternating current through the transmitter coil. This magnetic field induces small currents in the earth, which in turn generate a secondary

magnetic field. The electrical instrument receiver records both the primary and secondary magnetic fields, and displays a terrain conductivity based on the ratio of the primary to secondary magnetic fields (Quadrature), or as an absolute reading of the secondary magnetic field (In-phase).

The EM-31 device measures ground conductivity with an effective depth of investigation of 10 to 18 feet. The instrument consists of a fixed-spaced transmitter and receiver located on either end of a 12-foot boom. The instrument is strapped over the shoulder and held at waist height. The electronics of the instrument are located in the middle of the boom and continuously display the data on a digital or analog screen. A datalogger records this data automatically at pre-determined time increments or by manually pushing a button at grid nodes.

Two types of readings can be obtained from the instrument, a quadrature (out-of-phase) reading and an in-phase reading. The quadrature phase reading measures the ground conductivity and is more sensitive to disturbed soil while the in-phase reading is more sensitive to buried metallic objects. Comparison of these readings allows the determination of the source of an anomaly.

In addition to the two types of readings, data can be recorded with the transmitter/receiver dipoles oriented either horizontally or vertically. The vertical position is the normal mode of operation. The instrument can be rotated 90° and put in the horizontal dipole mode with receiving coils oriented in a vertical position. When oriented in the vertical dipole position, the instrument response comes from the entire depth of penetration. For the horizontal dipole configuration, most of the instrument response comes from the first 6 feet of depth. When comparing data taken in both orientations, one can get a relative determination as to the depth of the anomaly. This technique was used at the FTA to determine if shallow permafrost was present.

Data Display

All of the EM data was processed for display in the field. After collection of the EM data, the data points were downloaded from the datalogger and converted to data points on a cartesian grid. Contour maps of the gridded points of both readings were then generated to determine the locations of the potential anomalies. The contour maps presented in the following report are shown in color scale to accentuate the anomalous zones.

Equipment Setup and Methods of Data Collection

Prior to collection of the EM data, the instrument was calibrated and checked following the manufacturers instructions. All calibrations were done near the FTA in the open field between the runway and the north edge of the dike road in an area expected to be free from subsurface metal. No problems were encountered with the initial calibration of the equipment.

EM data for each site were collected at predetermined grid nodes after the establishment of the grid corners. At the FTA, Alternate Landfill Site, and West Landfill Site, the grid nodes were established by stretching out a pre-marked rope along the edges of the grid and collecting the data at the marked nodes. The data at the Ambient Site was collected using pace and compass techniques as a result of obstructions such as the baseball diamond and the tall grass. The data were then fitted to the map based on the known locations of the end of the grid lines.

3.0 Results of the Investigation

The geophysical investigation yielded excellent results for the definition of past waste disposal sites. The combination of the EM and GPR data worked effectively to delineate the size and depth of the waste pits. Unfortunately, the geophysical techniques met with mixed results in determining the location and depth of permafrost. The results of the surveys at each site are presented in the following sections.

3.1 Ambient Site

EM and GPR data were collected at the Ambient Site to help in defining geophysical anomalies that could be the result of shallow permafrost. These data were collected to help in determining the response of permafrost on GPR and EM instruments for interpretation of the FTA data. Permafrost is known to be present at the Ambient Site as several boreholes were abandoned during the 1992 RI field season after encountering shallow permafrost in the area of the baseball field.

Data Grid and Data Collection

Initially, six GPR lines were collected at the Ambient Site to determine if a radar anomaly would result from the presence of shallow permafrost. Since it was known that the permafrost was detected around 10-feet bgl at this site in the past, 100 megahertz antennae were used with the GPR to get better resolution of the shallower features.

In addition to the GPR transects, an irregular grid of approximately 700-feet by 400-feet was used for an EM survey. Grid node spacing was approximately 40-feet by 20-feet. Because of high grass and the man-made obstructions around the baseball field, the lines along which the EM data were collected were determined by compass bearing, and paced distances. A rope marked in 20-foot increments was stretched out on the ground along the same line as radar profile BASE2. This line was used as the northern base line

for subsequent data collection. All transects were taken at 90-degrees to this baseline. After the EM survey was complete, the data were adjusted to fit landmarks on the basemap to the known locations of the ends of the lines. Figure 3-1 shows the location of the EM grid and the GPR lines at the Ambient Site.

Results

Figure 3-2 is a contour map of the ground conductivity data collected at the Ambient site. A linear anomaly can clearly be seen trending northwest from well 04-MW-03. The anomaly seen in the ground conductivity map is also visible in the in-phase map (Figure 3-3), but is not as pronounced. This anomaly crosses GPR line BASE3 from trace 150 to 200 (Figure 3-4). In comparison to the features identified during the GPR survey, the origin of the anomaly is not clear. Based on the in-phase response, it is probable that the middle part of the anomaly may represent a metallic object. A similar anomaly was detected on the west edge of the grid. This anomaly also is likely to represent an isolated piece of buried metallic debris.

A continuous anomaly exhibited on the GPR lines at the Ambient site could be interpreted to represent shallow permafrost. This event is clear on GPR lines BASE1, BASE2, and BASE4 (Figure 3-5) and is represented by the curved surface at about 100 ns (11 feet) on the records. A downward dipping reflector which may be the edge of the permafrost can clearly be seen on lines BASE1 at trace 550 and BASE4 at trace 425. This anomaly is approximately 10-feet to 14-feet deep and extends over the area of where the baseball field is located. Figure 3-6 is a contour map of the top of this anomaly and its approximate limits, where detectible. This area corresponds to the area where numerous holes were drilled and permafrost was encountered during the 1992 field investigation.

Two other distinct anomalous events were also detected with the GPR records. a convex-downward anomaly can be seen on line BASE2 (Figure 3-7) at trace 300 and on

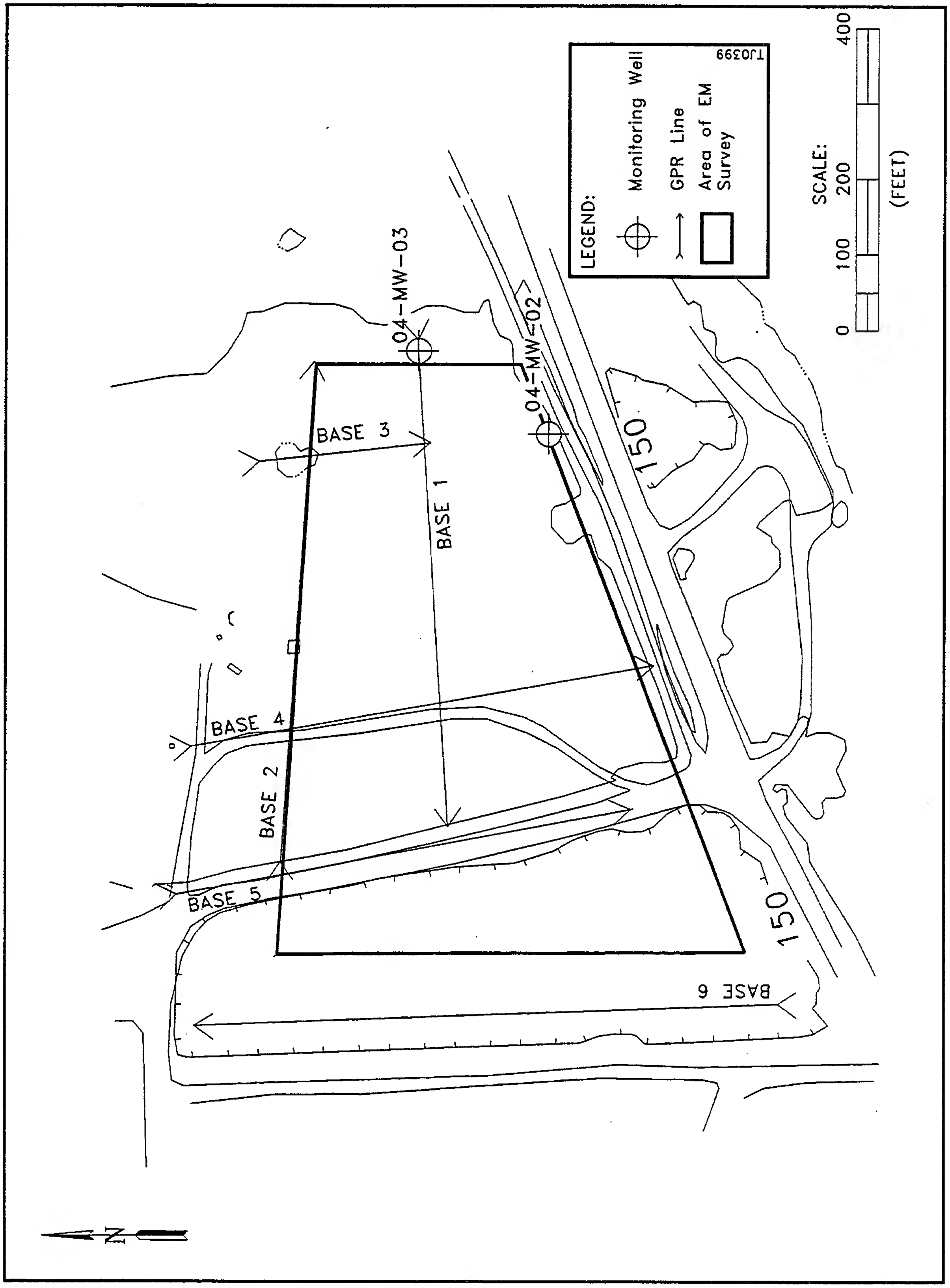


Figure 3-1. Outline of EM Grid and Location GPR Lines at the Ambient Site

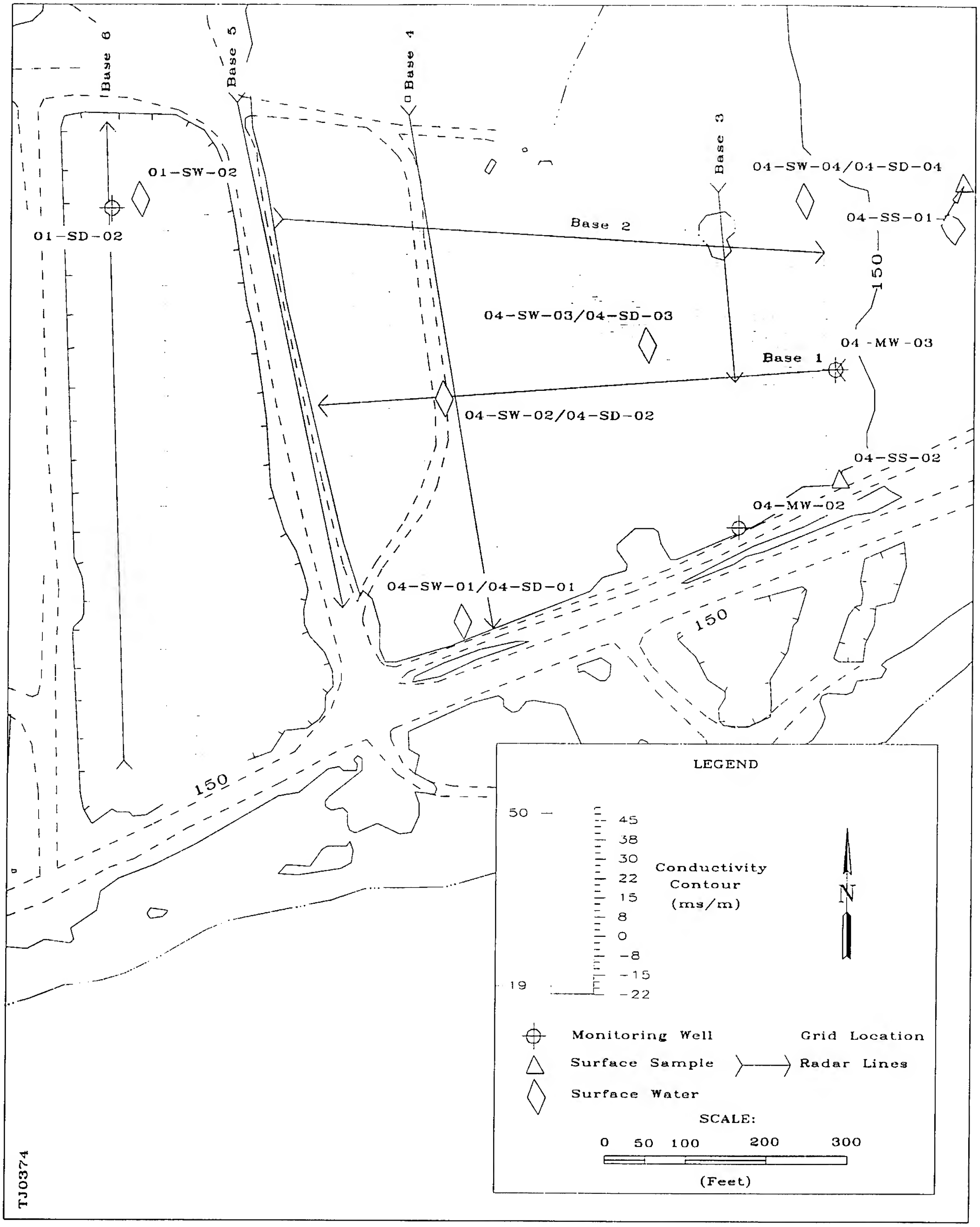


Figure 3-2. Conductivity Contour Map of the Ambient Site

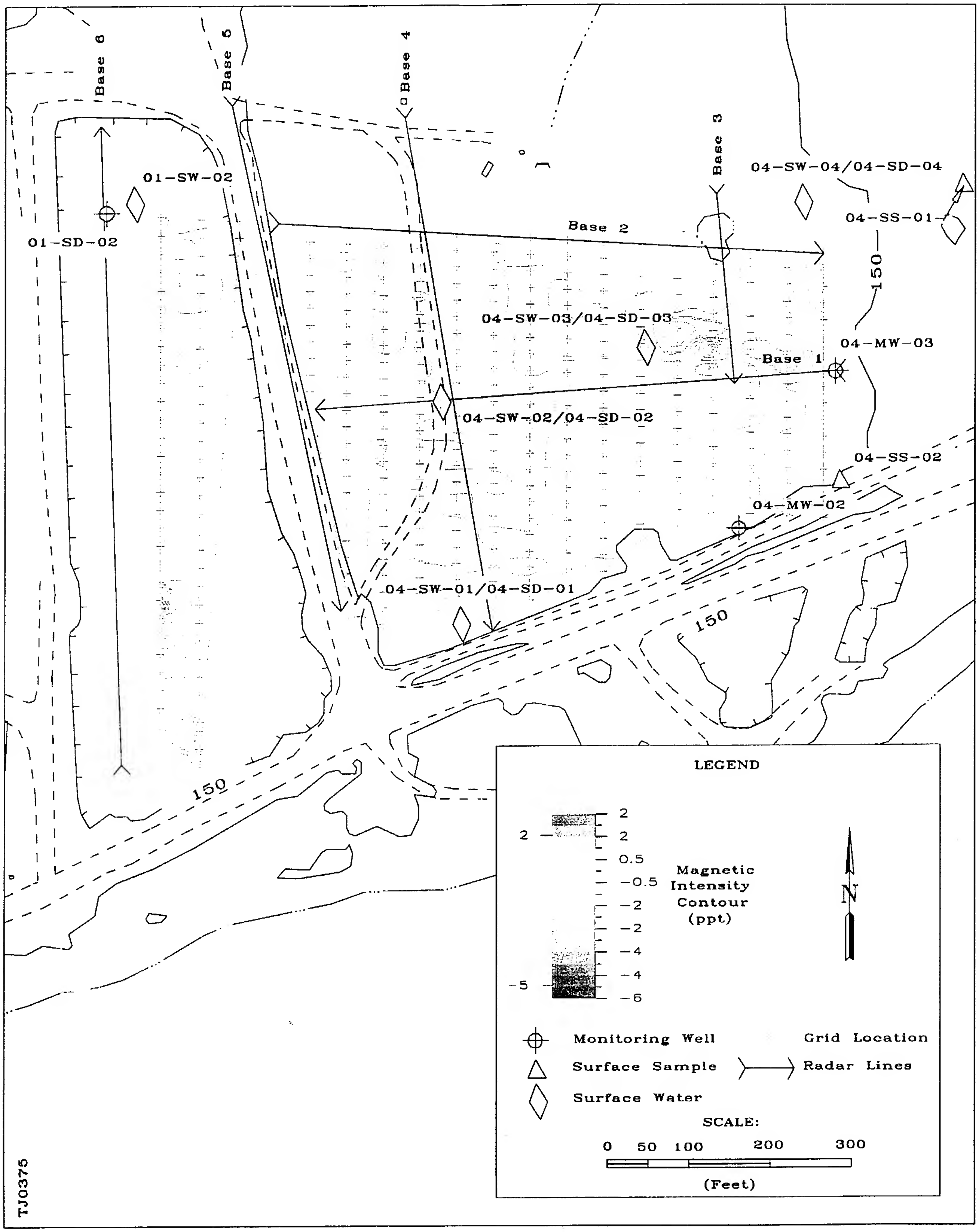


Figure 3-3. In-Phase Contour Map of the Ambient Site

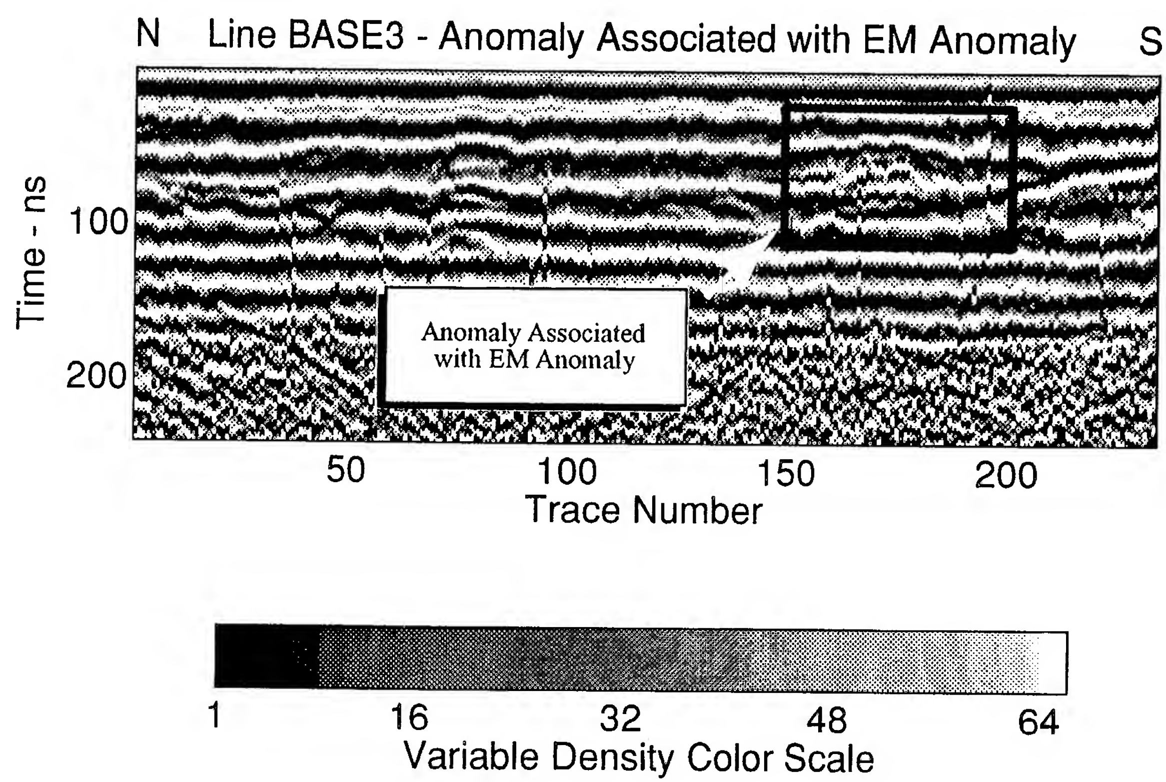


Figure 3-4. GPR Line BASE3 Showing Crossing of EM Anomaly

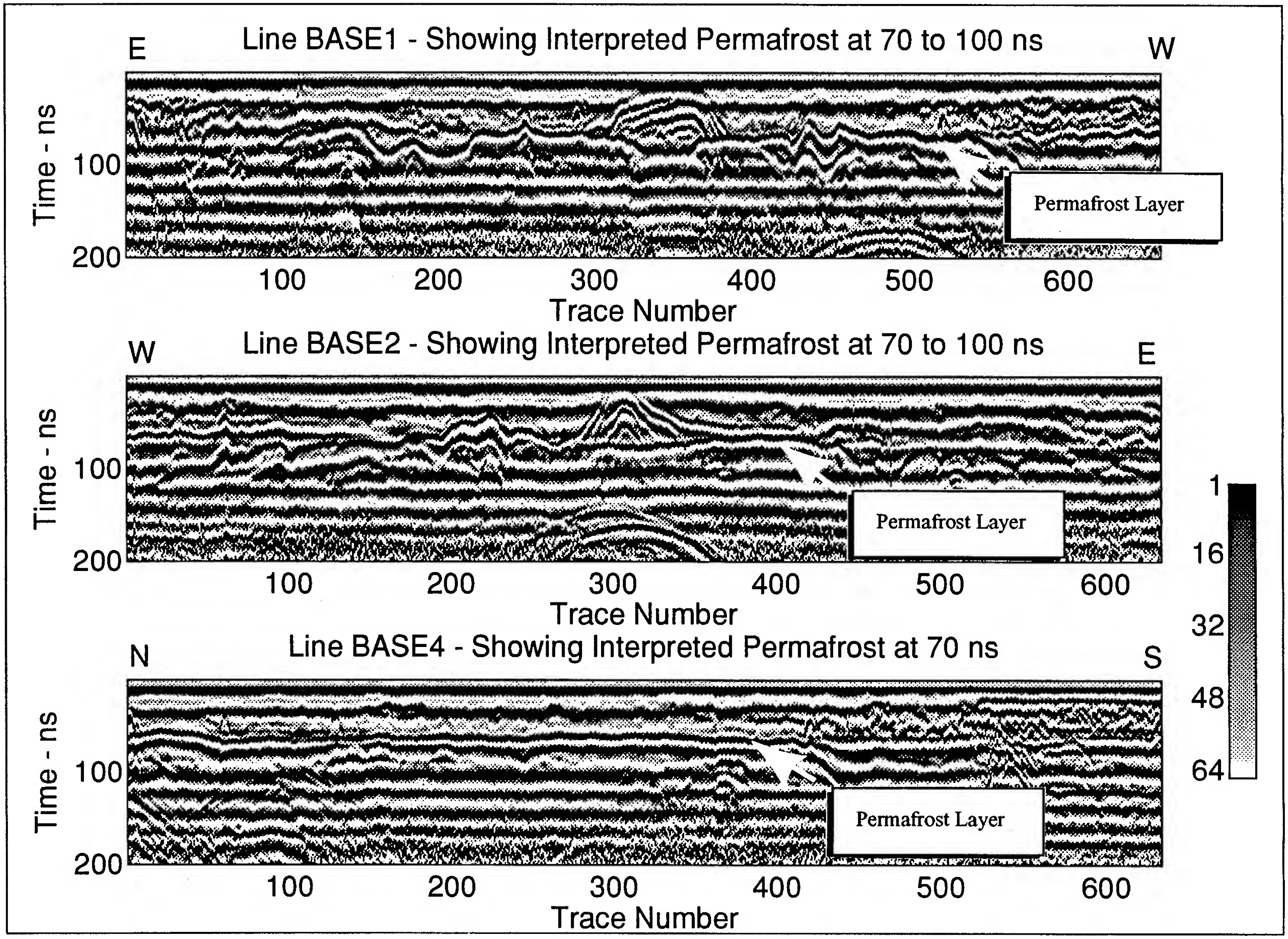


Figure 3-5. GPR Lines Showing Permafrost

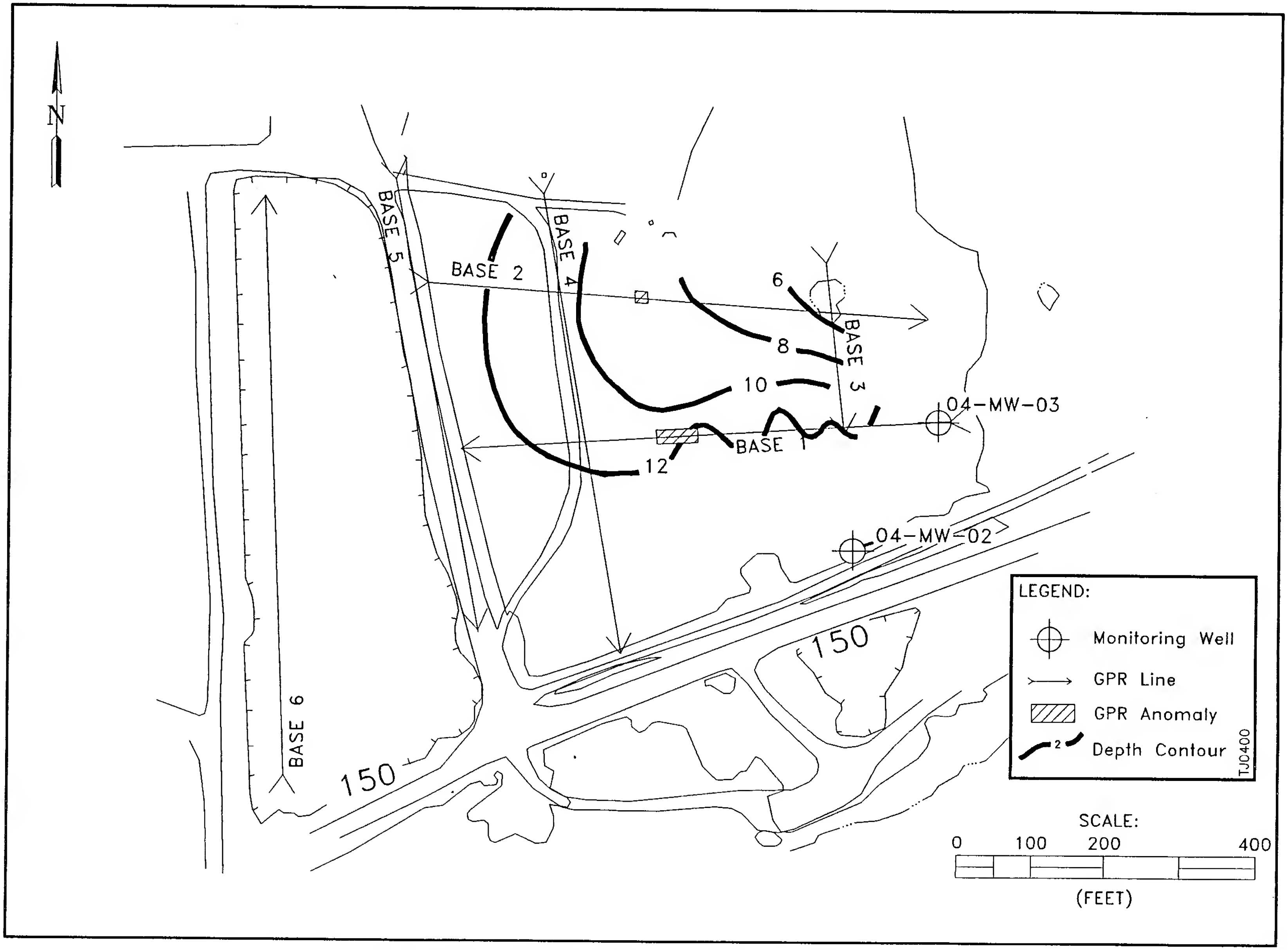


Figure 3-6. Contour Map of Interpreted Top of Permafrost

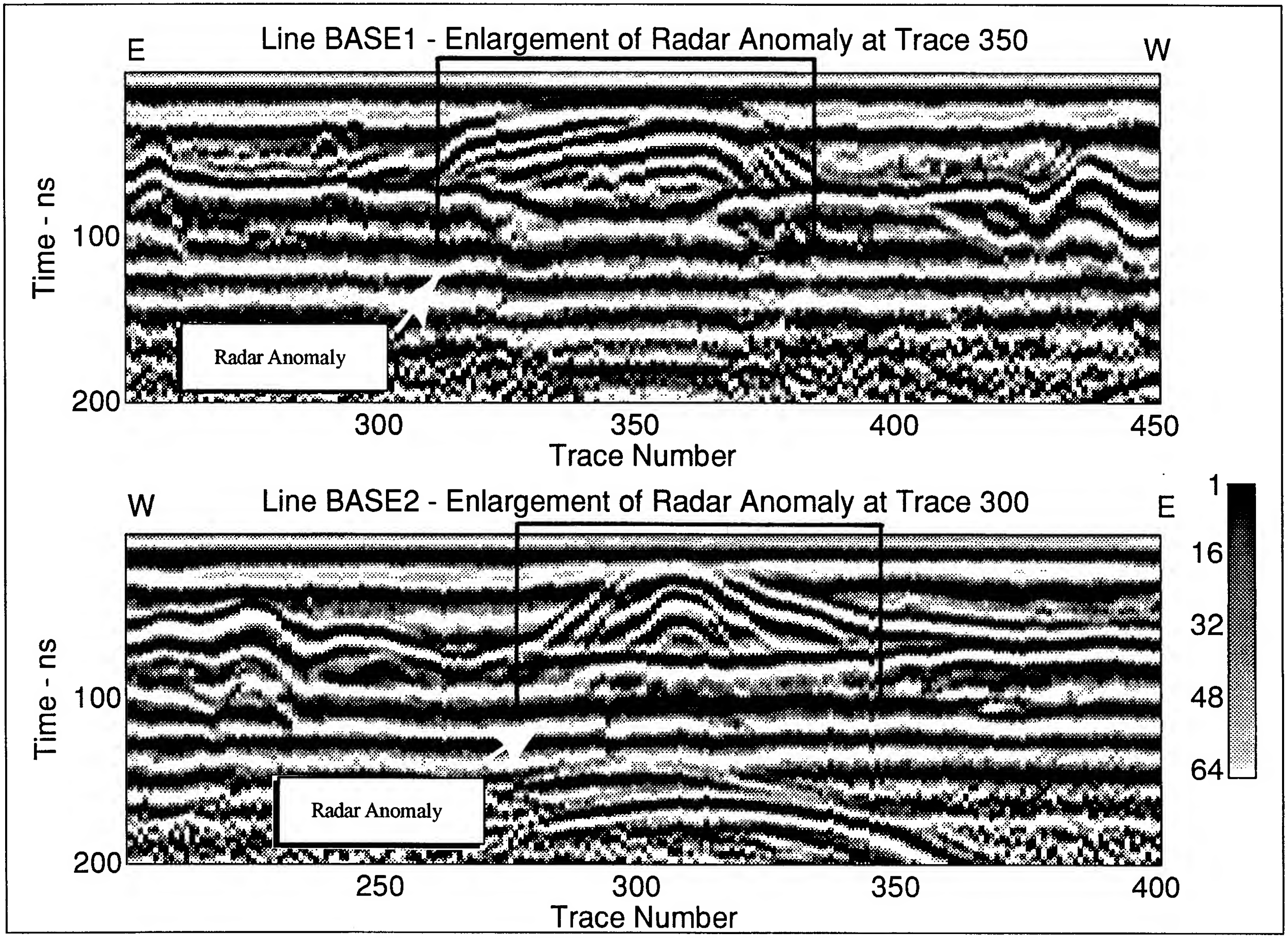


Figure 3-7. GPR Lines Showing Radar Anomalies

BASE1 at trace 325 to 375. These are highlighted on Figure 3-6. It is not known if these anomalies form a continuous event and there origin is unclear.

3.2 Fire Training Area

The geophysical investigation at the FTA was undertaken to determine if continuous permafrost could be detected under the site in order to assess the effect of the permafrost layer on groundwater flow. This information was also intended to be used to identify drilling locations free from permafrost, as permafrost has frequently caused problems during previous drilling operations at Galena AFS. One target of particular interest at the FTA Site was the permafrost layer encountered at approximately 25 feet below ground level (bgl) in well 01-MW-06 and at 80 feet bgl in 01-MW-01.

Data Grid and Data Collection

A 300-foot by 280-foot grid was established at the site and the corners were marked with survey stakes (Figure 3-8). After the four corners of the survey grid were established, two ropes that were marked every 20 feet were laid out north-south along the east and west edges of the grid. Fifteen 300-foot radar lines were collected in the east-west direction and 3 lines were collected in the north-south direction. The GPR data was collected using a fiberglass tape as discussed in section 2. The EM data were collected using the same technique, but with ropes marked at 10-foot intervals.

Quadrature and in-phase data were collected in both the vertical and horizontal dipole orientation at the FTA. The data were collected with the instrument placed on the ground to insure a uniform sampling height and to collect data around the mock airplane which was still at the site. As the mock airplane was elevated above ground, the instrument could be placed under the plane and data could be collected at the established grid nodes beneath the plane.

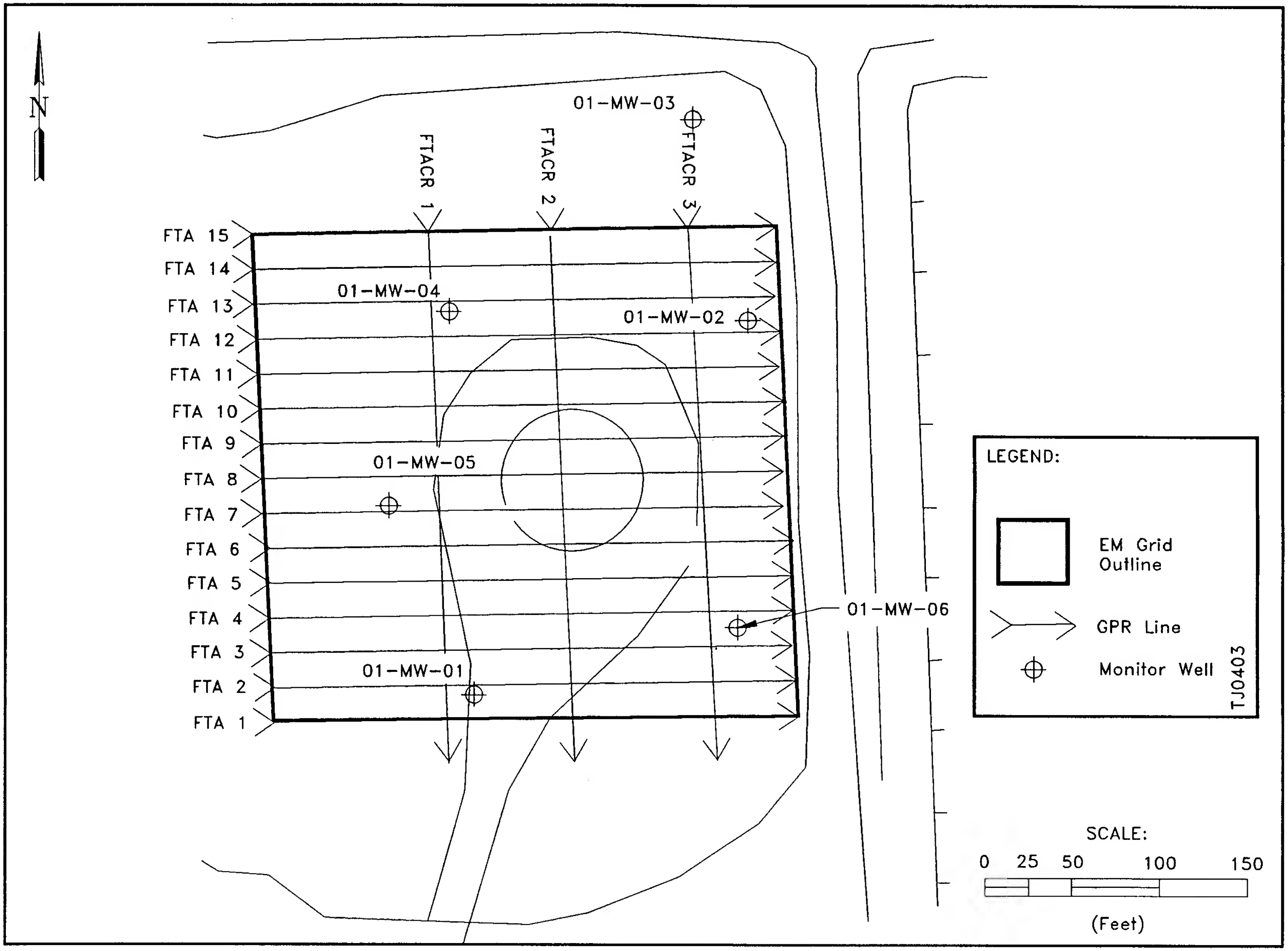


Figure 3-8. Data Grid for EM and GPR Survey at the FTA

Results

Contour maps of the EM data (Figures 3-9 through 3-12) did not indicate the presence of any detectable trend of shallow permafrost. Figures 3-9 and 3-11 are the quadrature phase (conductivity) contour maps for the vertical and horizontal dipole orientations, respectively. The distinct anomalies located in the center ring of the FTA pit are probably derived from the mock airplane. Two linear anomalies trend from the center of the FTA pit, one due south and the other to the southeast in the direction of well 01-MW-06. The nature of these anomalies is not clearly known, although they may be fuel lines used to spray fuel on the mock plane. Comparison of the vertical and horizontal conductivity contour (Figures 3-10 and 3-12, respectively) indicate that the two linear anomalies probably come from greater than six feet in depth.

The GPR was utilized at the FTA to attempt to detect the permafrost encountered in wells 01-MW-01 and 01-MW-06. A total of fifteen, 300-foot long, east-west lines and three north-south, cross-lines were collected at the site (Refer to Figure 3-8). No continuous permafrost layer was detected on any of the GPR lines. Based on the difference in the dielectric constant of ice and saturated sand (3-4 versus 20-30), permafrost should have been detected on the GPR records, if it were present.

Several factors probably contributed to the inability to detect permafrost. The most likely is that it was not there. The shallow permafrost zones encountered in the previously drilled wells may have melted. Drilling at several areas at the Galena AFS has demonstrated that the "permafrost" encountered during drilling may be isolated lenses of frozen soil, and may not be present from year to year. Based on both the EM and GPR data obtained this summer, there appears to be no continuous permafrost beneath the site which is higher than about 70-feet below ground level (The limit of depth resolution for the radar).

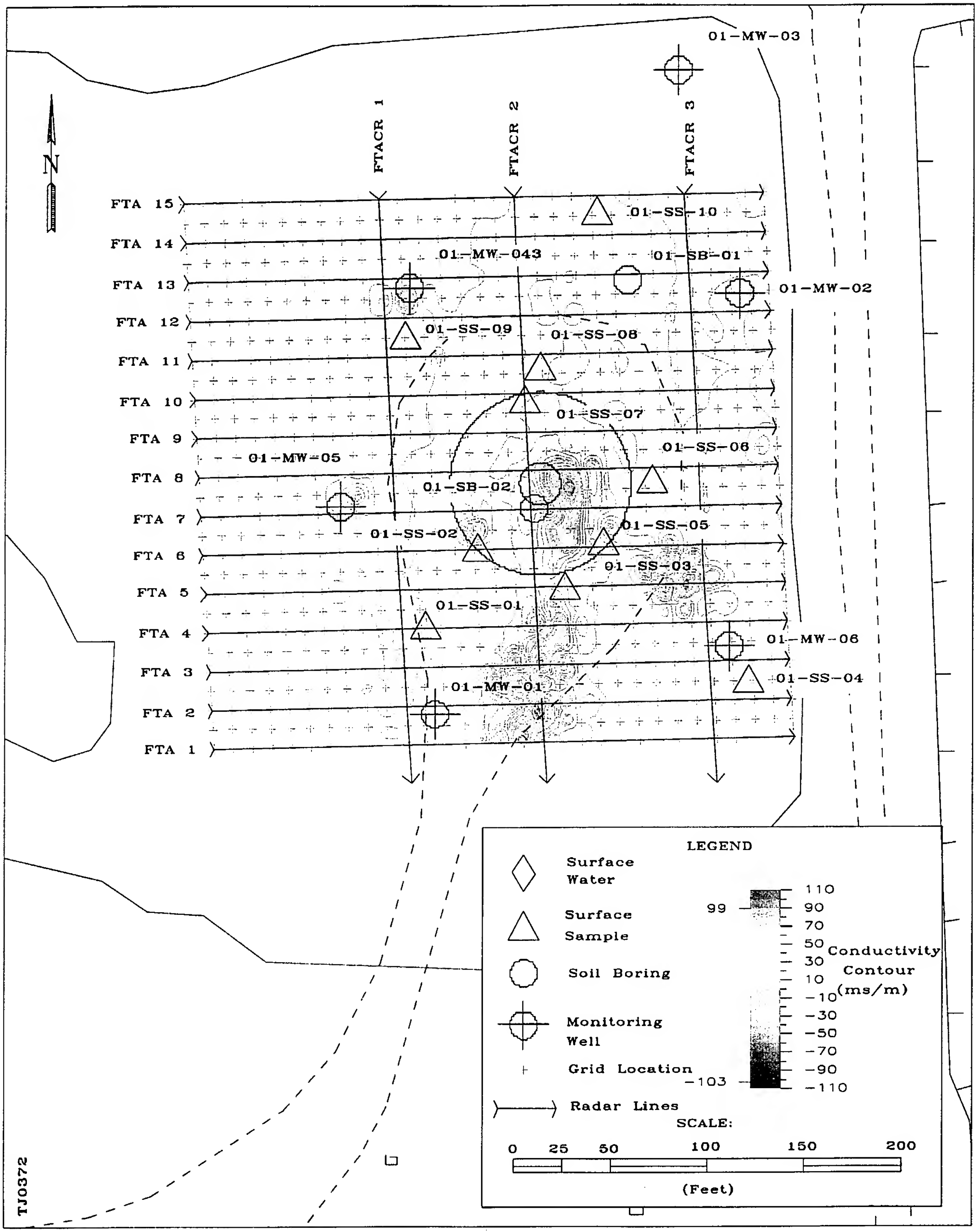


Figure 3-9. Contour Map of Quadrature Phase EM Data, Vertical Dipole Orientation

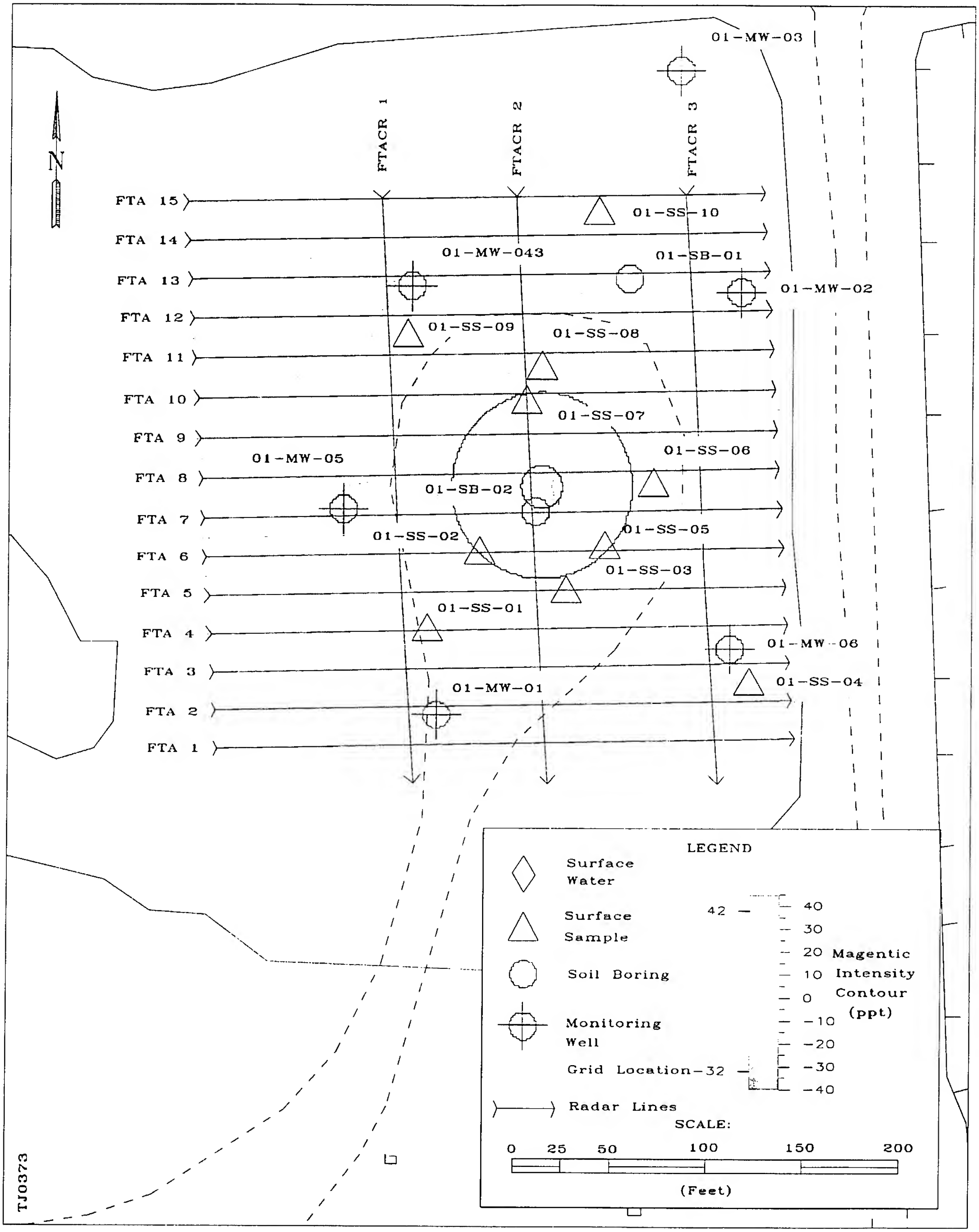


Figure 3-10. Contour Map of In-Phase EM Data, Vertical Dipole Orientation

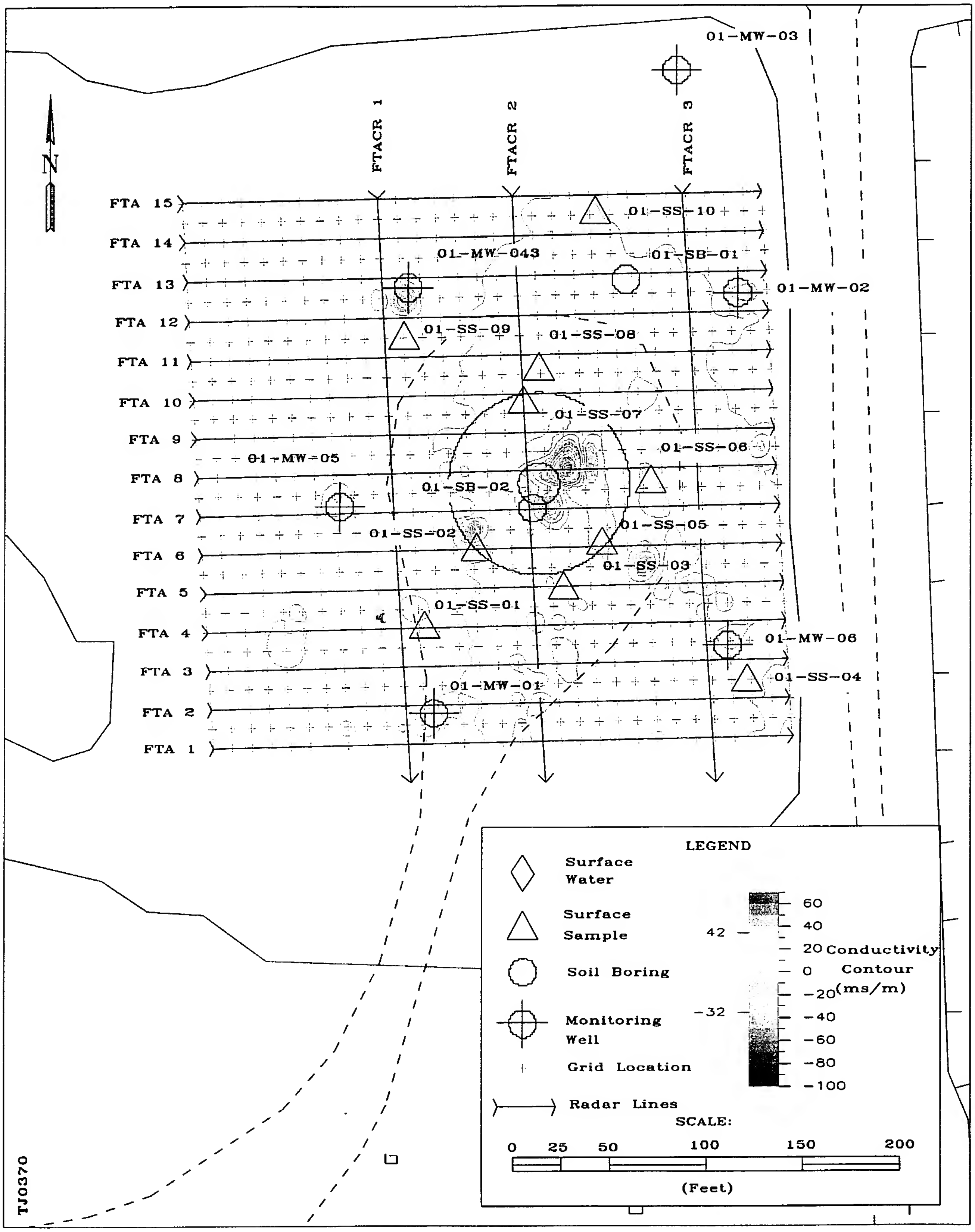


Figure 3-11. Contour Map of Quadrature Phase EM Data, Horizontal Dipole Orientation

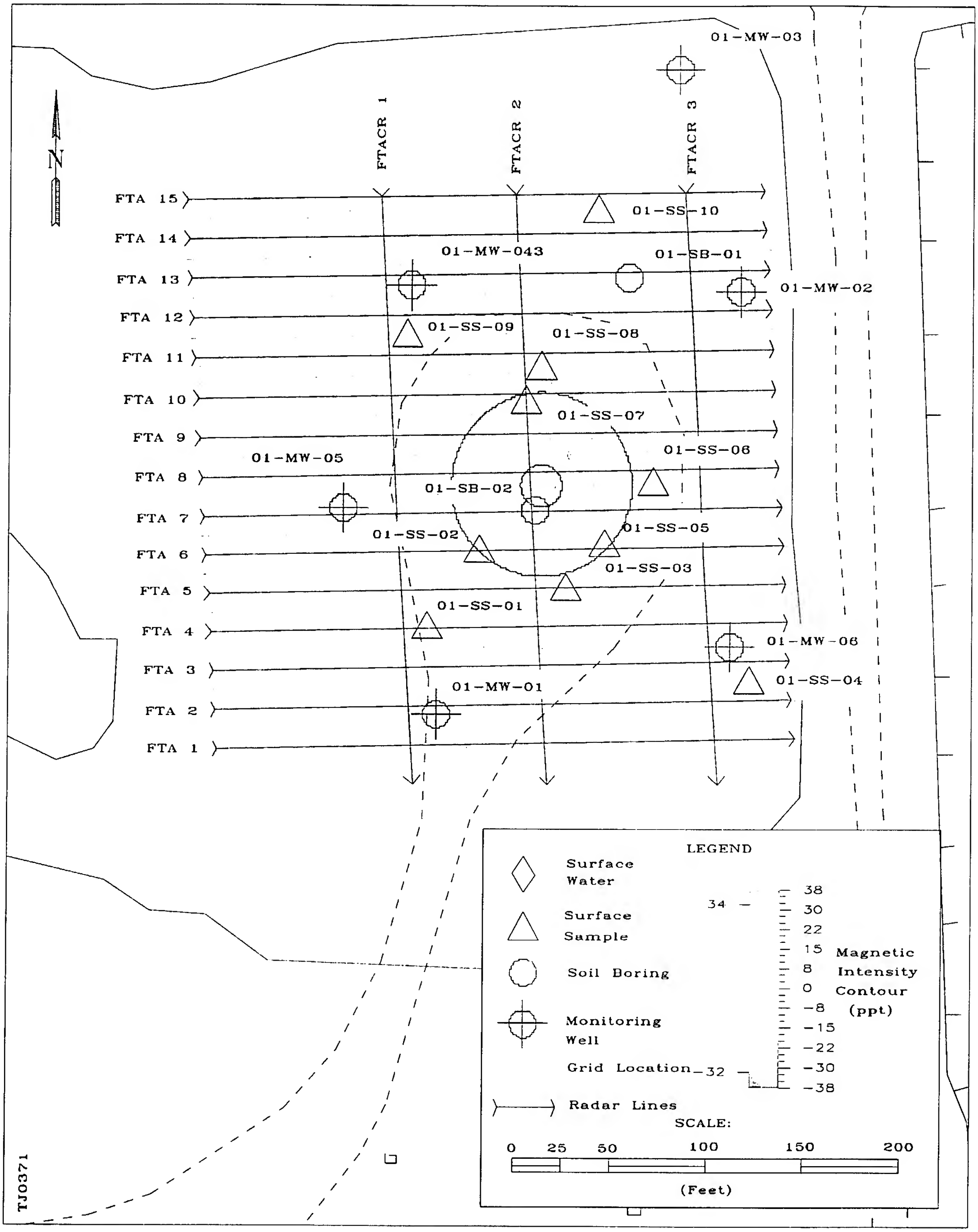


Figure 3-12. Contour Map of the In-Phase EM Data, Horizontal Dipole Orientation

Another reason the permafrost may not have been detected is the high conductivity of the groundwater (roughly 1200 ms/m from water samples at the site) which could have interfered with or destroyed the radar signal within the saturated zone. Based on previous drilling logs, the permafrost was encountered below were the depth that the water level was during the GPR survey. Still another problem may have been that radar reflections from the mock airplane obliterated reflections from permafrost. For this particular radar system, the antenna are not shielded from above ground interference and the GPR records will show reflections from above ground metallic objects.

Despite the inability to map any continuous permafrost, the radar survey provided important insight into the site stratigraphy. Figure 3-13 shows GPR lines FTA2, FTA7, and FTA13. These lines show a well developed channel between traces 50 and 150, from the surface to approximately 120 to 150 ns (16 feet bgl). The records also show the hummocky cross-bedded stratigraphy expected from an accretionary complex associated with lateral stream migration. Figure 3-14 is a contour map of the base of the channel, and depicts the interpreted environments of deposition. The north-south trend to the channel and the shallow depth indicate that it probably was a fairly recent tributary or slough which cut across the large point bar on which Galena AFS is constructed.

The detection of this channel feature helps explain why boring logs at different locations at the FTA have been difficult to correlate in the first 20 feet to 25 feet below ground level. This channel may also serve as a potential pathway for contaminant migration during high river stages, and may be affecting the groundwater flow at the site.

Another feature clearly seen on the radar record in Figure 3-13 are the strong reflections from the mock airplane. Mapping of the crest of the structure formed by the air arrivals (signals reflected from above ground features) indicate that they come from the mock airplane. By calculating the velocity of the radar wave in air (.95 ft/ns), any point along these strong reflectors can be calculated to be the distance from the ground location of the corresponding radar trace to the mock airplane.

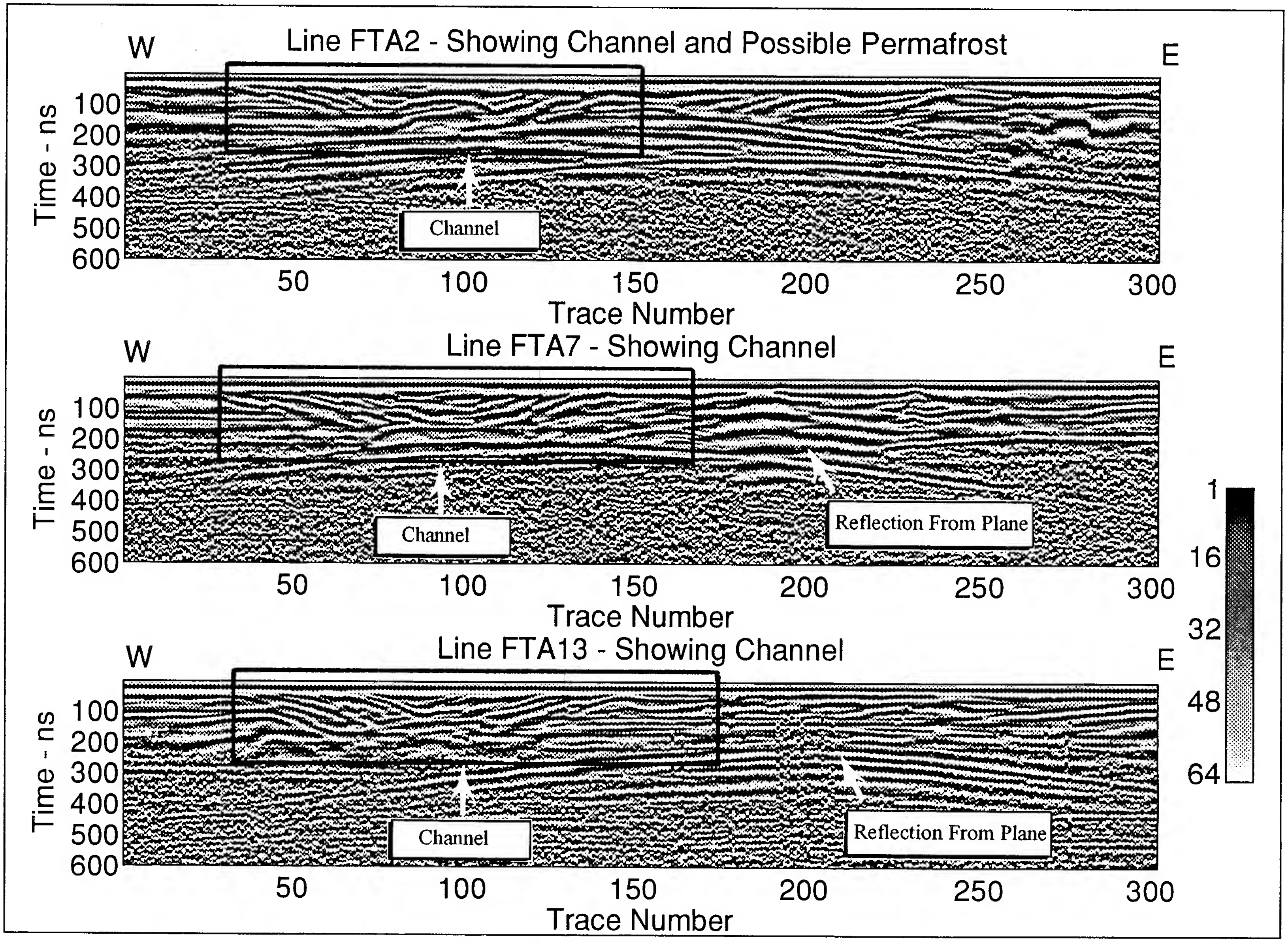


Figure 3-13. GPR Lines Showing Channel Feature

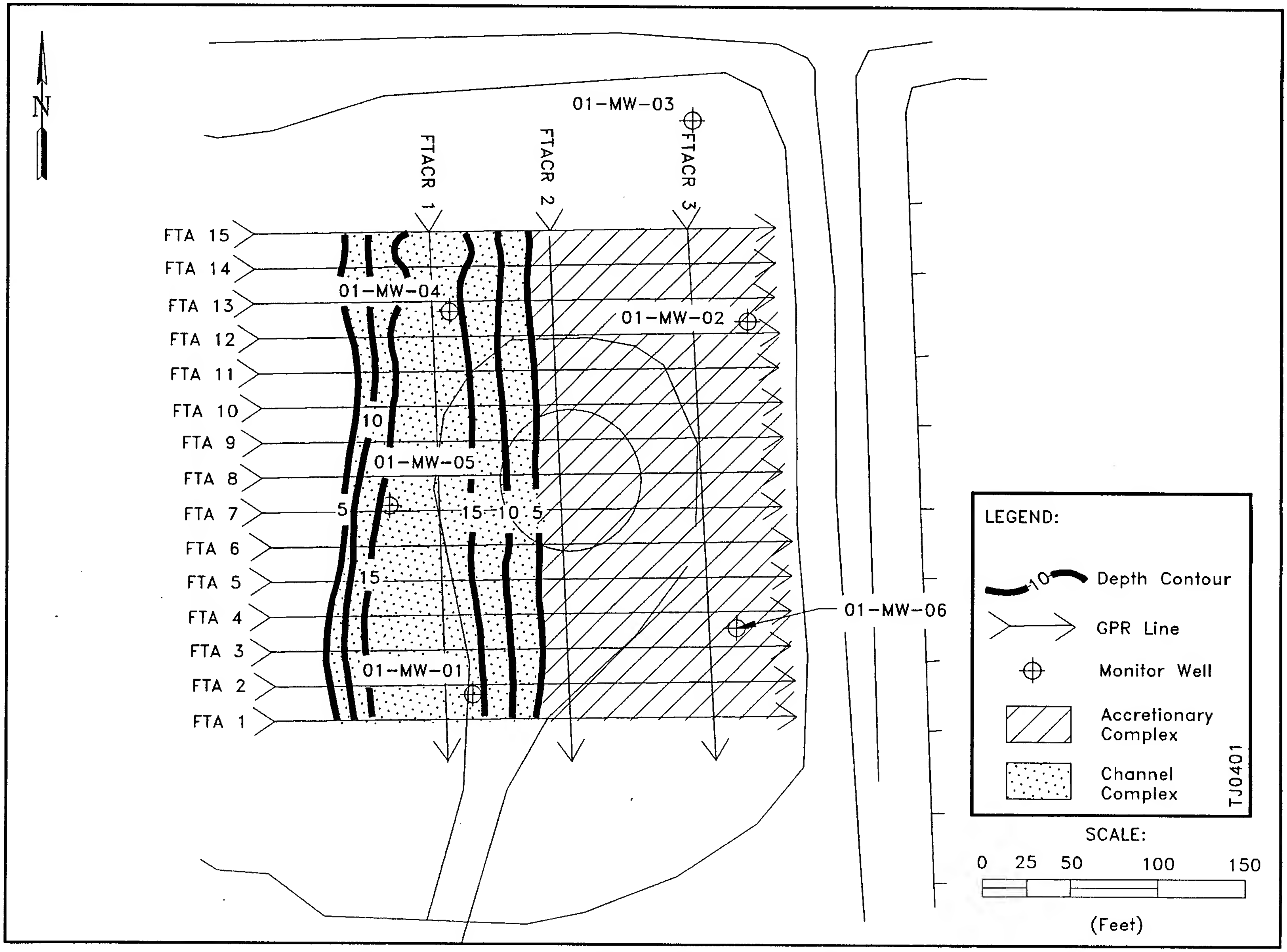


Figure 3-14. Contour Map of the Depth of the Channel

Three other radar anomalies were detected at the FTA. These were on lines FTA2 and FTACR3 in the southeast corner of the grid. Two anomalies appear on line FTA2 between traces 260 and 280 from 60 to 120 ns (7 to 13 feet bgl), and one on line FTACR3 from trace 260 to 290 between 50 and 200 (6 to 22 feet bgl)ns (Figure 3-15). Figure 3-16 shows the location of these anomalies. These could represent shallow, isolated lenses of frozen soil such as have been encountered elsewhere at Galena AFS.

3.3 Alternate Landfill Site

The EM and GPR surveys were performed at the Alternate Landfill Site to determine areas of buried metallic objects (caches of drums, etc.), and if possible, the areal extent and the depth of the landfill debris. The site is a relatively flat, cleared area approximately 300-feet by 150-feet. Little vegetation is growing over the exposed area. Much of the eastern and northern sides of the site has remnants of drums, metal machinery (mars) pads, and scrap metal debris exposed on the surface. The northeast corner of the site has a natural depression 3 to 4 feet below the rest of the grade. In addition to the EM data, two GPR lines were collected at the site to determine the depth of the landfill.

Data Grid and Data Collection

A 120-foot by 260-foot grid was established in the clearing at the site for collection of the EM data. Data were collected on a 10-foot node spacing at the site. Quadrature and in-phase data were collected in the vertical dipole position only. The corners of the grid were later surveyed and the data were tied into the basemap of the site. The outline of the EM grid and the locations of the GPR lines are shown in Figure 3-17.

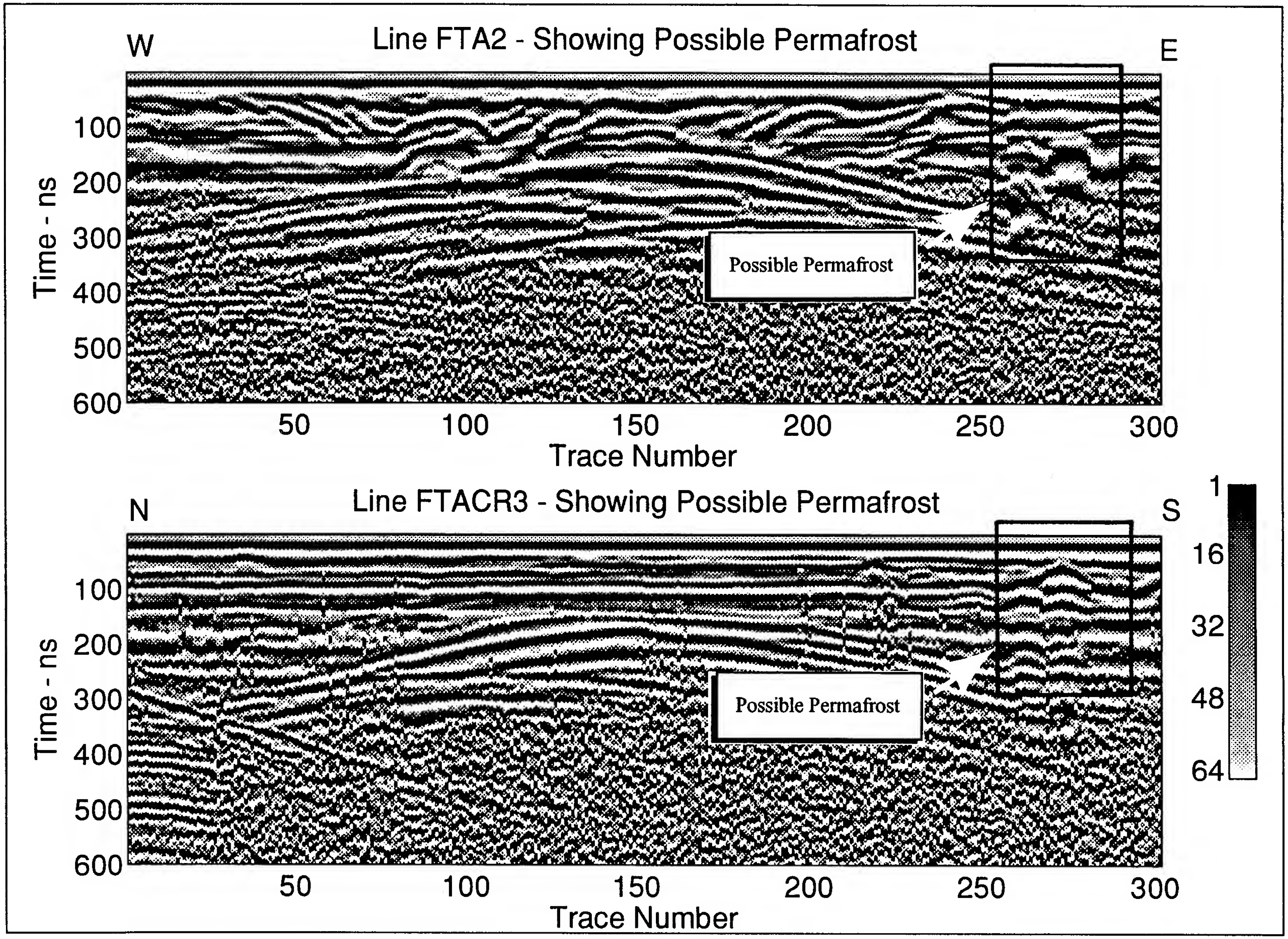


Figure 3-15. GPR Lines Showing Potential Permafrost

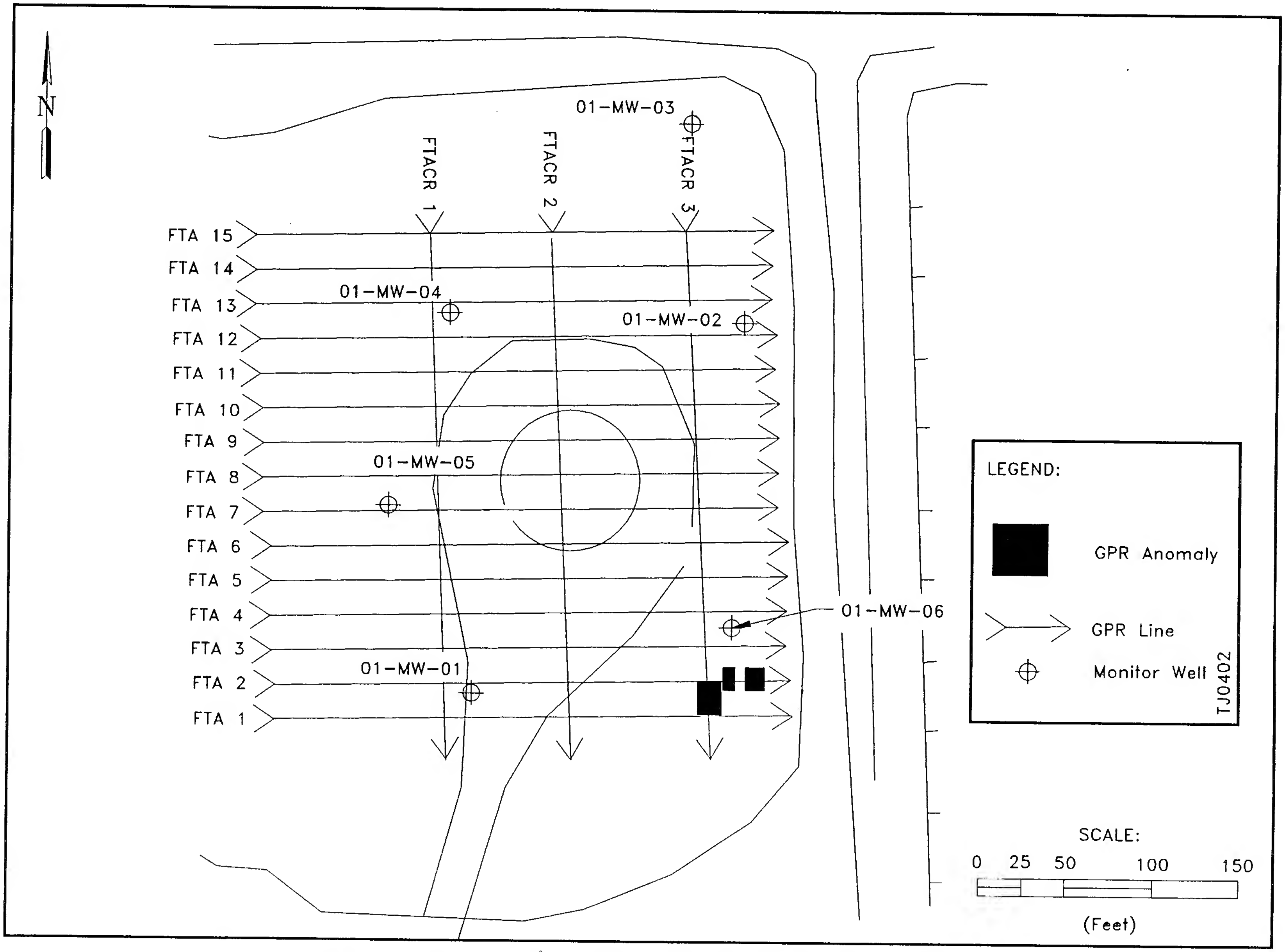


Figure 3-16. Location of Potential Permafrost Anomalies

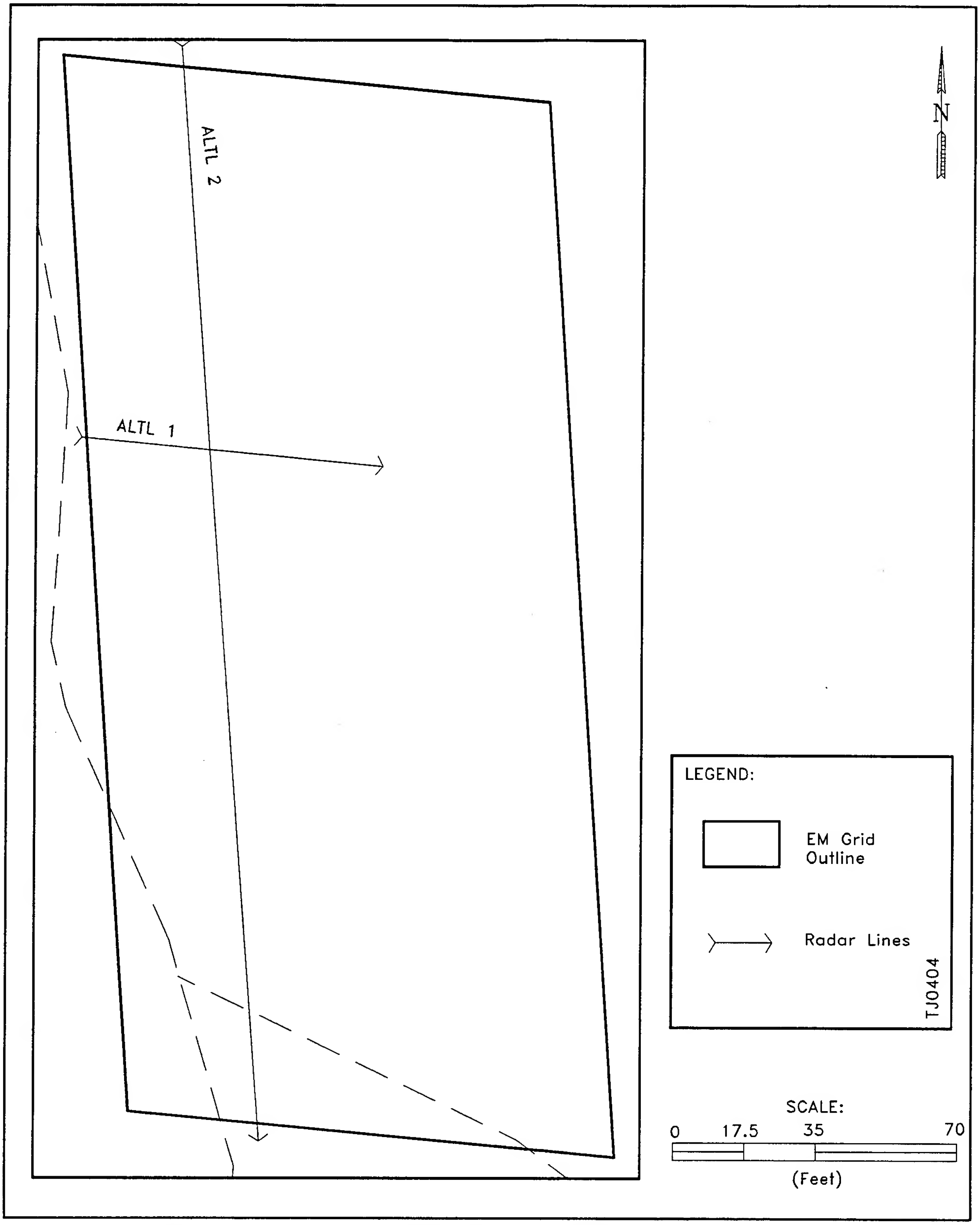


Figure 3-17. Outline of the EM Grid and Location of GPR Lines at the Alternate Landfill

Results

The EM and GPR surveys identified several areas which potentially have buried metallic objects. Figures 3-18 and 3-19 are contour maps of the quadrature and in-phase data collected at the site. Two main areas of EM anomalies were defined by the surveys, one in the northeast corner of the grid (Area A) and the other across the southeast corner of the grid (Area B, Figure 3-18). These areas appear as the yellow to bluish shaded zones on the contour plots. The in-phase contour plot (Figure 3-19), which is more susceptible to metallic objects, confirms that the areas represent buried metallic objects and are not changes in ground conductivity as a result of disturbed soil. Metallic debris was evident on the surface over much of the ground in Area A and on the east side of Area B. Drums were also visible on the ground north of the north end of GPR line ALTL 2. The survey was successful in locating other metallic objects not visible on the surface. Metallic objects were not noted on the surface in the southern end of Area B, yet the EM detected several anomalies. In addition, several isolated anomalies appear more enhanced on the in-phase plot. These are labeled I1 through I5, and probably represent isolated bodies of buried metallic or metal-bearing objects.

Analysis of the GPR lines collected at the site (Figure 3-20) indicates that the depth of the Alternate Landfill is at approximately 100 ns (8 to 12 feet). The interpreted depth of the landfill is shown in the outlined area in Figure 3-20. Also shown on GPR line ALTL 2 is the interpreted depth of the landfill. The two anomalies on the south end of the line closely correspond to the zones of metallic objects observed on the EM contour plots. The anomaly between traces 100 and 140 does not appear to correspond to any obvious metallic objects and its origin is not clear.

3.4 Southwest Landfill Site

The EM and GPR surveys were performed at the Southwest Landfill Site to determine areas of buried metallic objects (caches of drums, etc.) and, if possible, the areal

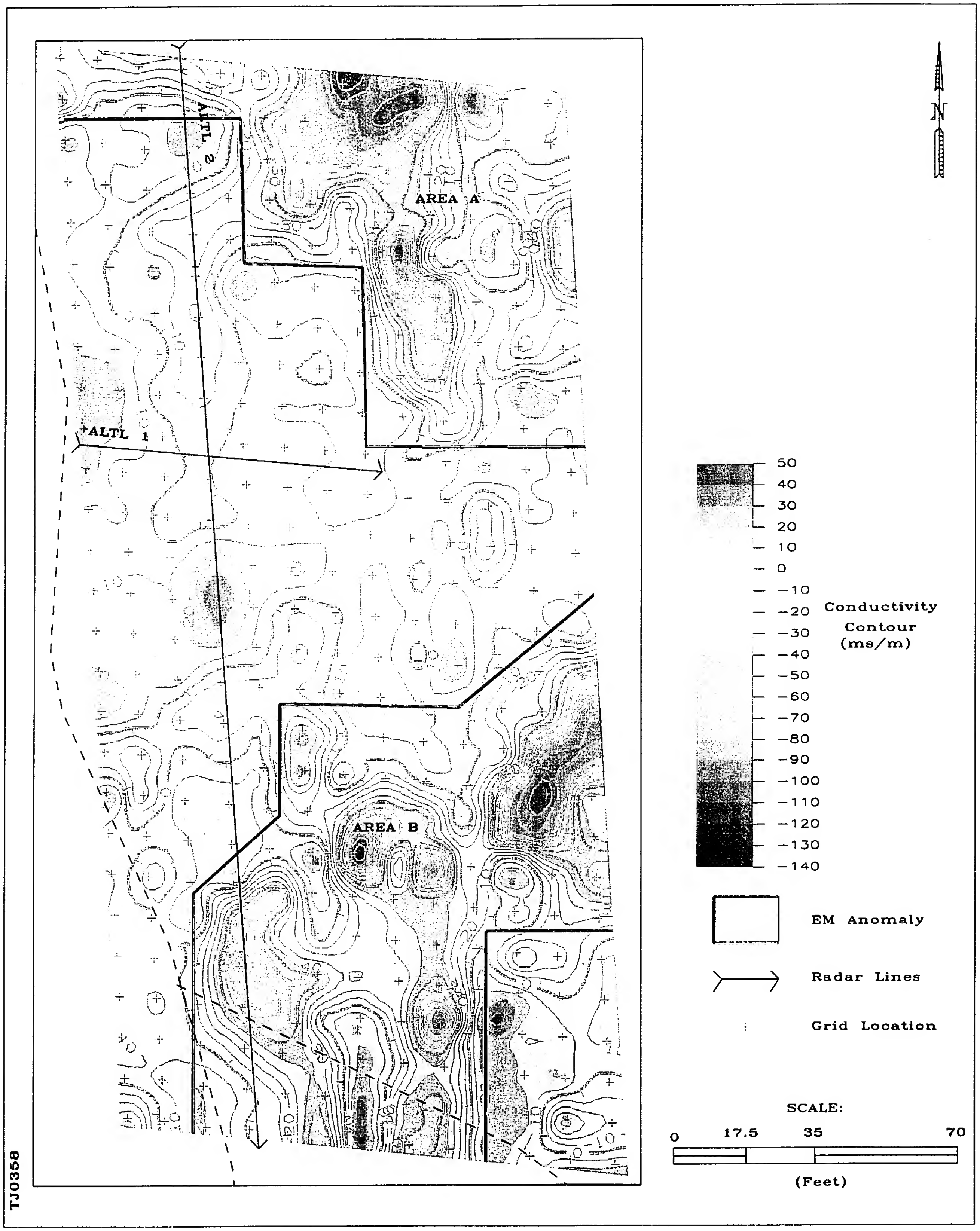


Figure 3-18. Contour Map of Quadrature EM Data Showing Locations of Anomalies

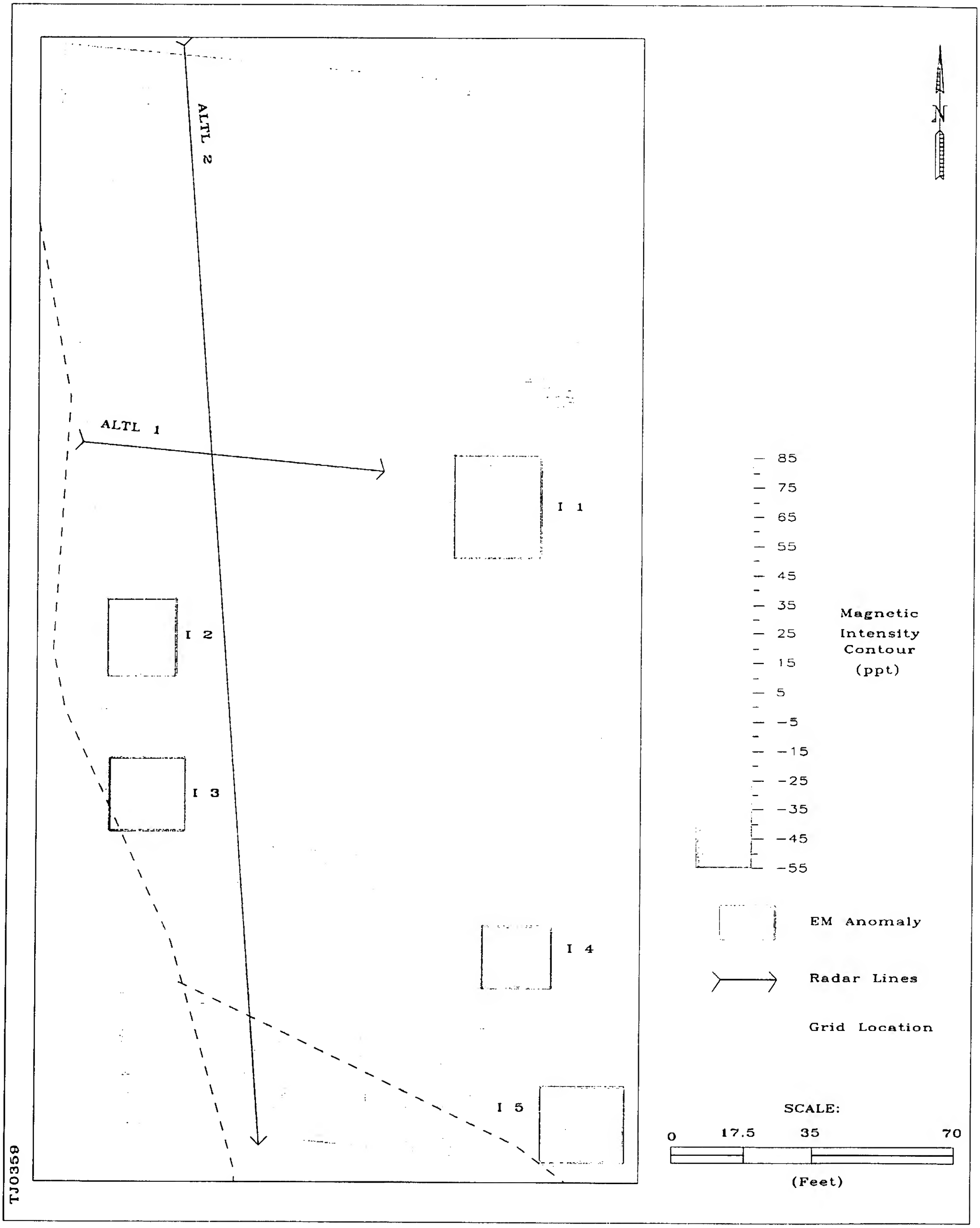


Figure 3-19. Contour Map of In-Phase EM Data Showing Locations of Isolated Anomalies

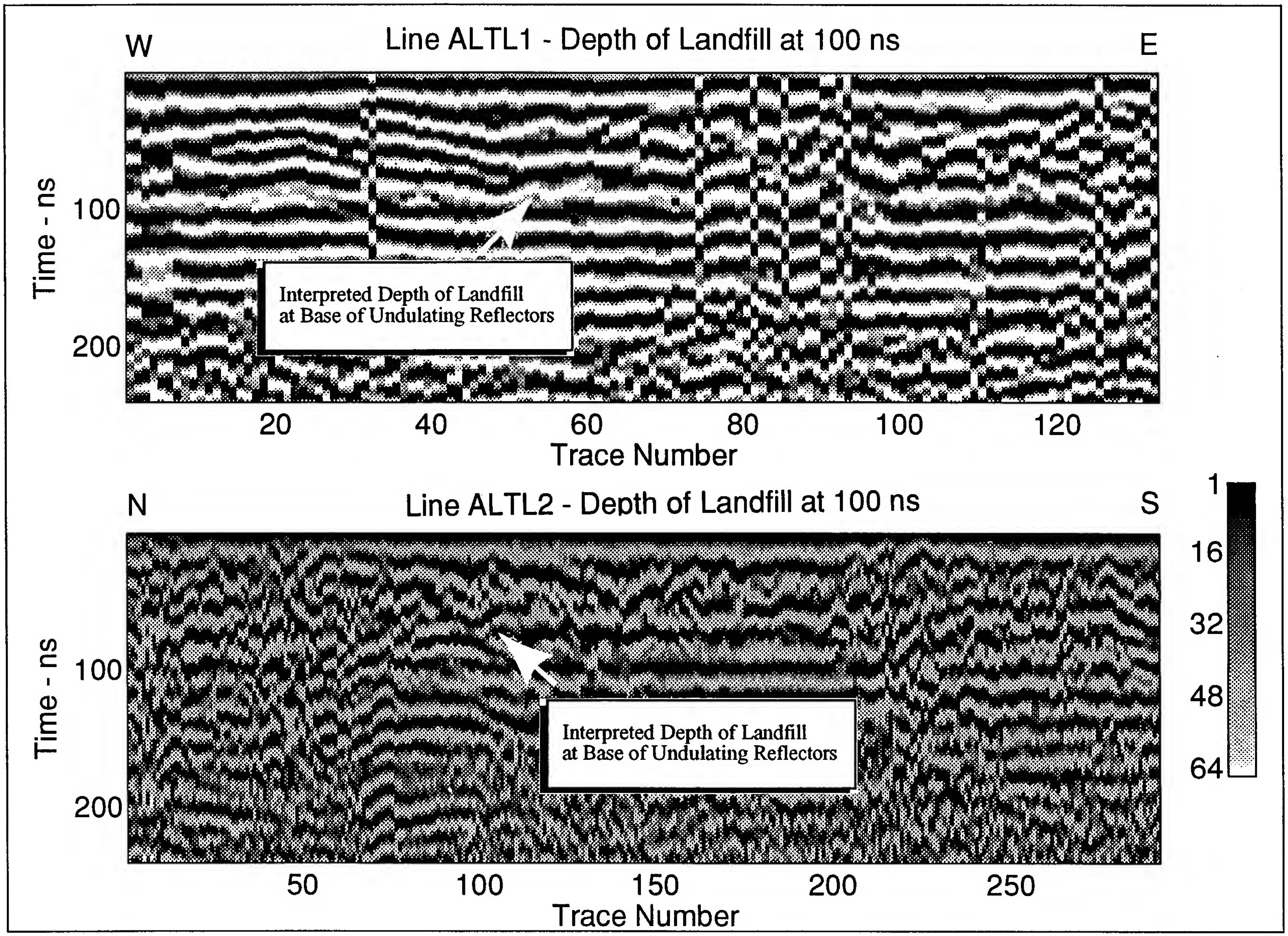


Figure 3-20. GPR Lines Showing Depth of Alternate Landfill

extent and the depth of any landfill debris. After review of aerial photographs and discussions with local base personnel, it was suspected that virtually the entire 8+ acre field west of the runway had been used for waste disposal, and at one time, asphalt manufacturing. It was decided in the field that the EM survey would be the most effective method of investigation and this method was used to cover the entire area of interest. The Southwest Landfill Site which was originally scoped for the EM survey was investigated by brief reconnaissance EM survey. No anomalies were detected and it was decided that a regular grid of data would not be collected at this location.

After a field review of the EM data collected during this survey, several GPR lines were collected to investigate the source and depth of the main anomalies detected using EM. Because of the size of the expanded area of investigation and the difficulty of access for the GPR equipment, it was not feasible to collect a regular grid of GPR data over the entire area.

Data Grid and Data Collection

Initially, a 1120-foot baseline was established along the east edge of the site, and survey markers were placed every 20 feet along the length of this line. Stations were established every 40 feet on the west edge of the site by taking a 90-degree bearing from the original baseline markers. The data were collected on a 20-foot x 20-foot grid by laying out ropes marked in 20-foot increments between the survey markers. Quadrature and in-phase data were taken in the vertical dipole position at the site. Several points around the grid were later surveyed to tie the data back to the basemap for the site.

GPR lines collected at the site were referenced to the survey stakes for the EM grid. Figure 3-21 shows the outline of the EM grid and the locations of the GPR lines.

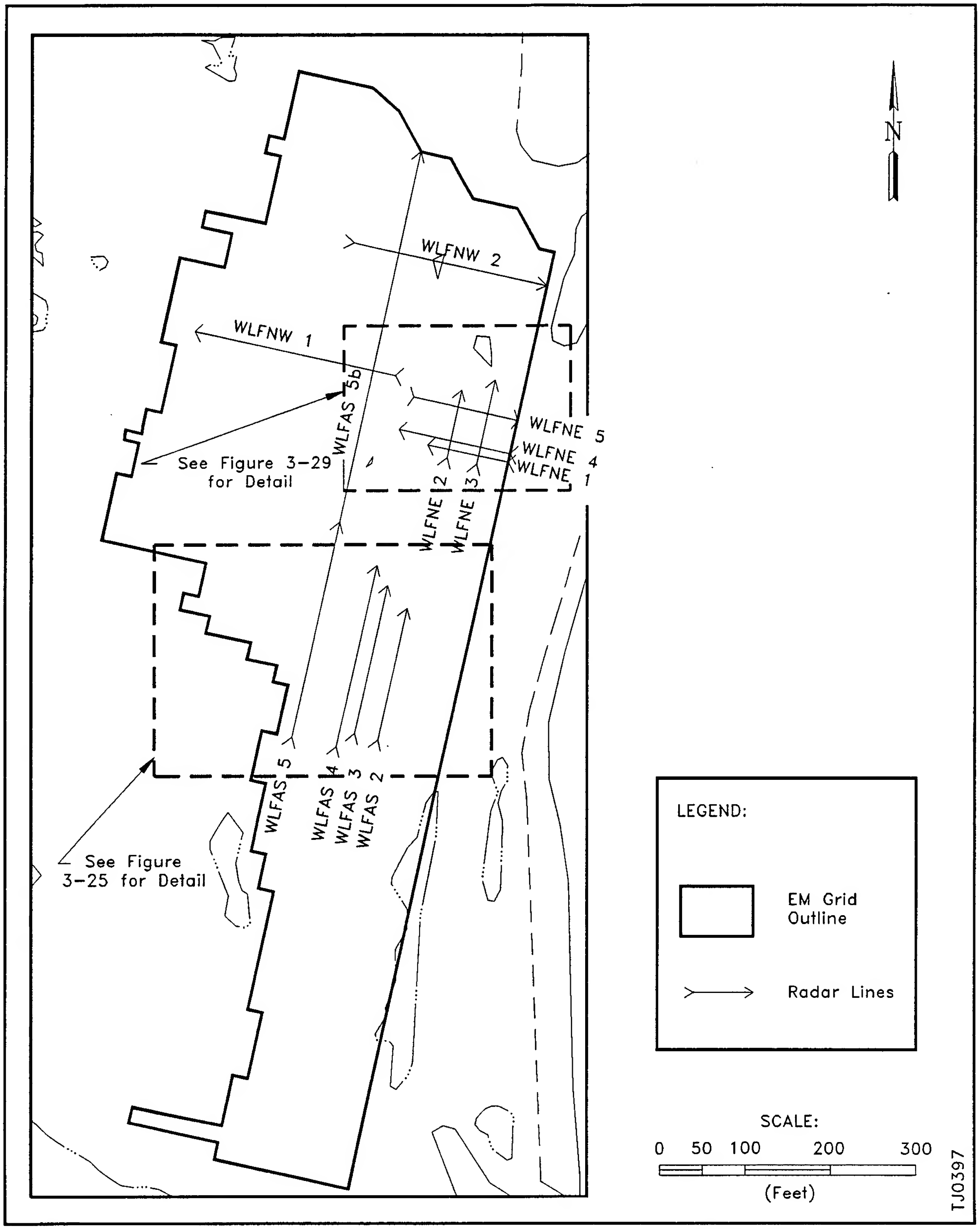


Figure 3-21. Outline of the EM Grid and Locations of the GPR Lines at the Southwest Landfill

Results

The EM-31 survey revealed five distinct anomalies in the ground conductivity readings. Figure 3-22 is a contour of the conductivity data for the site, with each of the separate areas outlined. Unlike the Alternate Landfill, metallic objects were rarely seen exposed on the surface at this site. Two anomalies in the upper part of the site (Area 6) are the result of an old concrete bunker and numerous 24-inch culvert pipes stacked at the end of the field. The anomalous readings are probably a result of rebar in the concrete. No large anomalies were detected in the southern half of the survey area. There is a gradual increase in background conductivity from the 10 to 20 millisiemen/meter (mS/m) range to the 20 to 25 mS/m range about 200 feet north of the southern edge of the site. It could not be determined from this geophysical investigation if this represents a natural fluctuation in the soil, or if this could potentially indicate a groundwater plume.

The in-phase contour map (Figure 3-23) indicates that most of the anomalies are either mostly or partially derived from metallic debris. The anomalies on this map are the same shape as on the conductivity map, but tend to pinpoint the individual areas of metallic waste. One anomaly that appears on the in-phase map (Area 7), but not on the conductivity map (as a result of the different contour interval), probably represents a single metallic object buried just under the surface. As previously stated, there are no major anomalies in the southern part of the site.

A total of 11 GPR profiles were collected. These covered parts of four of the five anomalous areas at the site. Four lines were collected in Area 1. Line WLFAS5 was continued as line WLFAS 5b north to the road. One line was collected across the major anomalies in area 3, and one line was collected across area 4. Both of these lines intersected line WLFAS 5. Five radar lines were collected in Area 5.

Figure 3-24 shows GPR lines WLFAS 2, WLFAS 3, and WLFAS 4, which were collected over the EM anomaly in Area 1 (Figure 3-25). All three lines show the

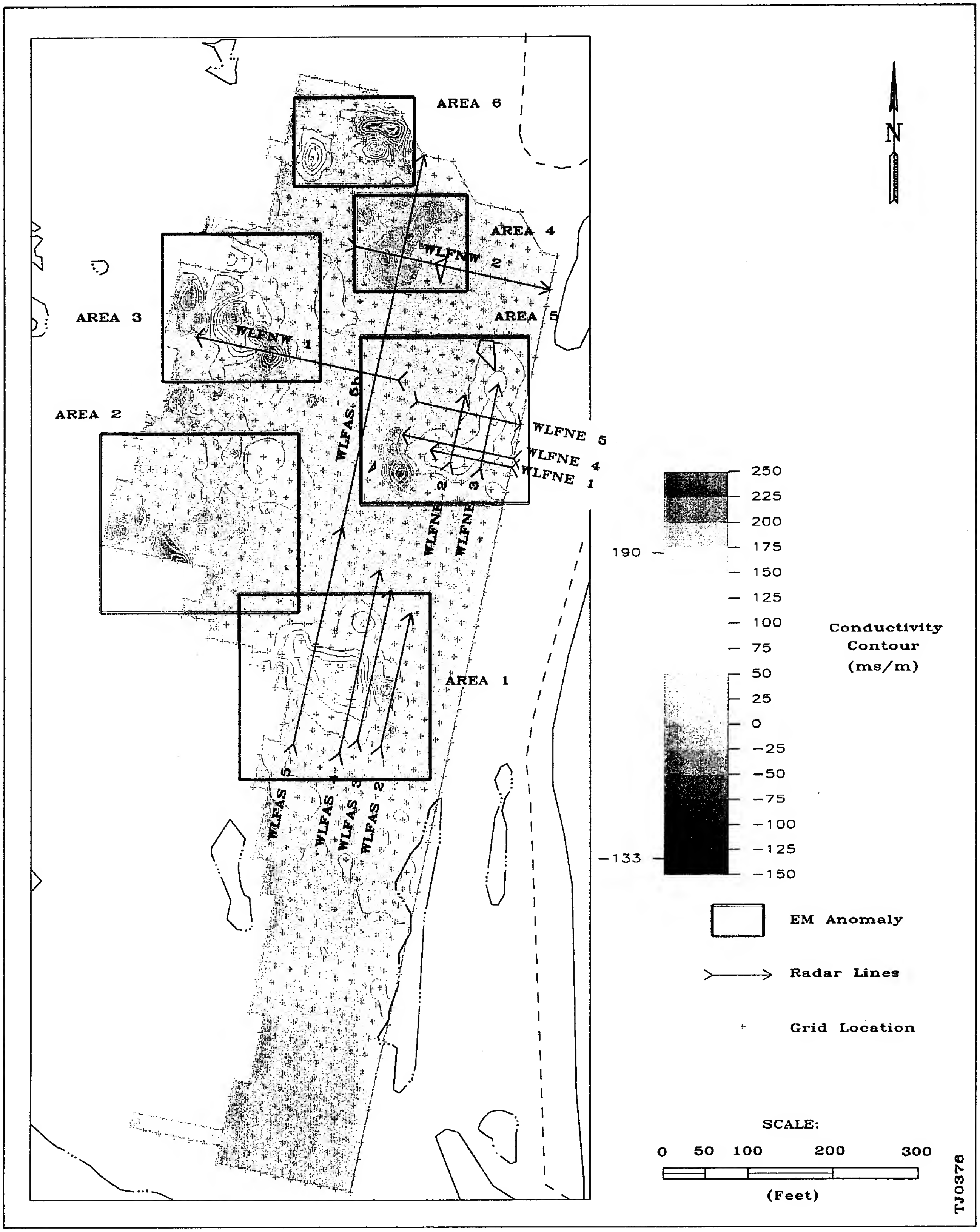


Figure 3–22. Conductivity Contour Map of the Southwest Landfill

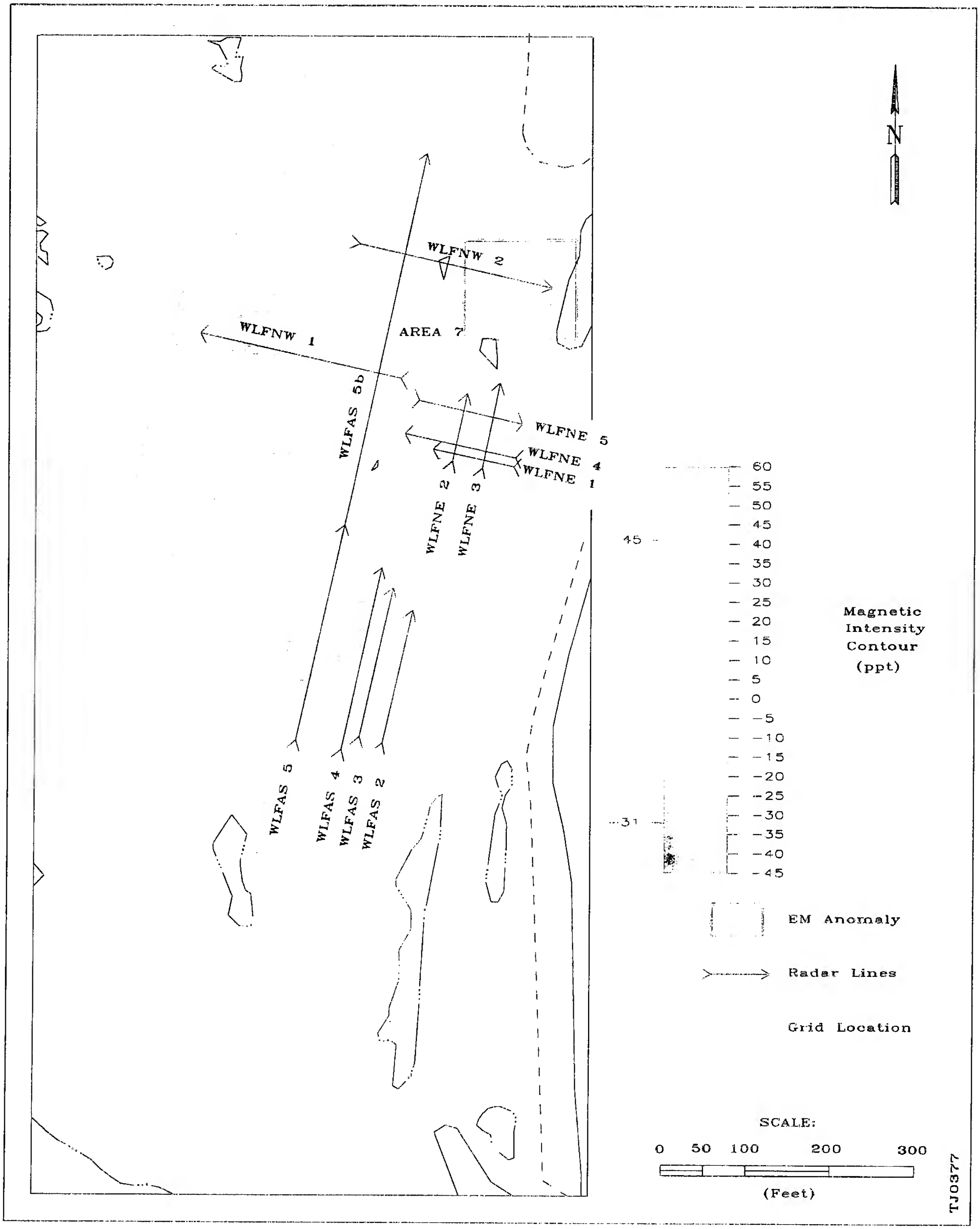


Figure 3-23. In-Phase Contour Map of the Southwest Landfill

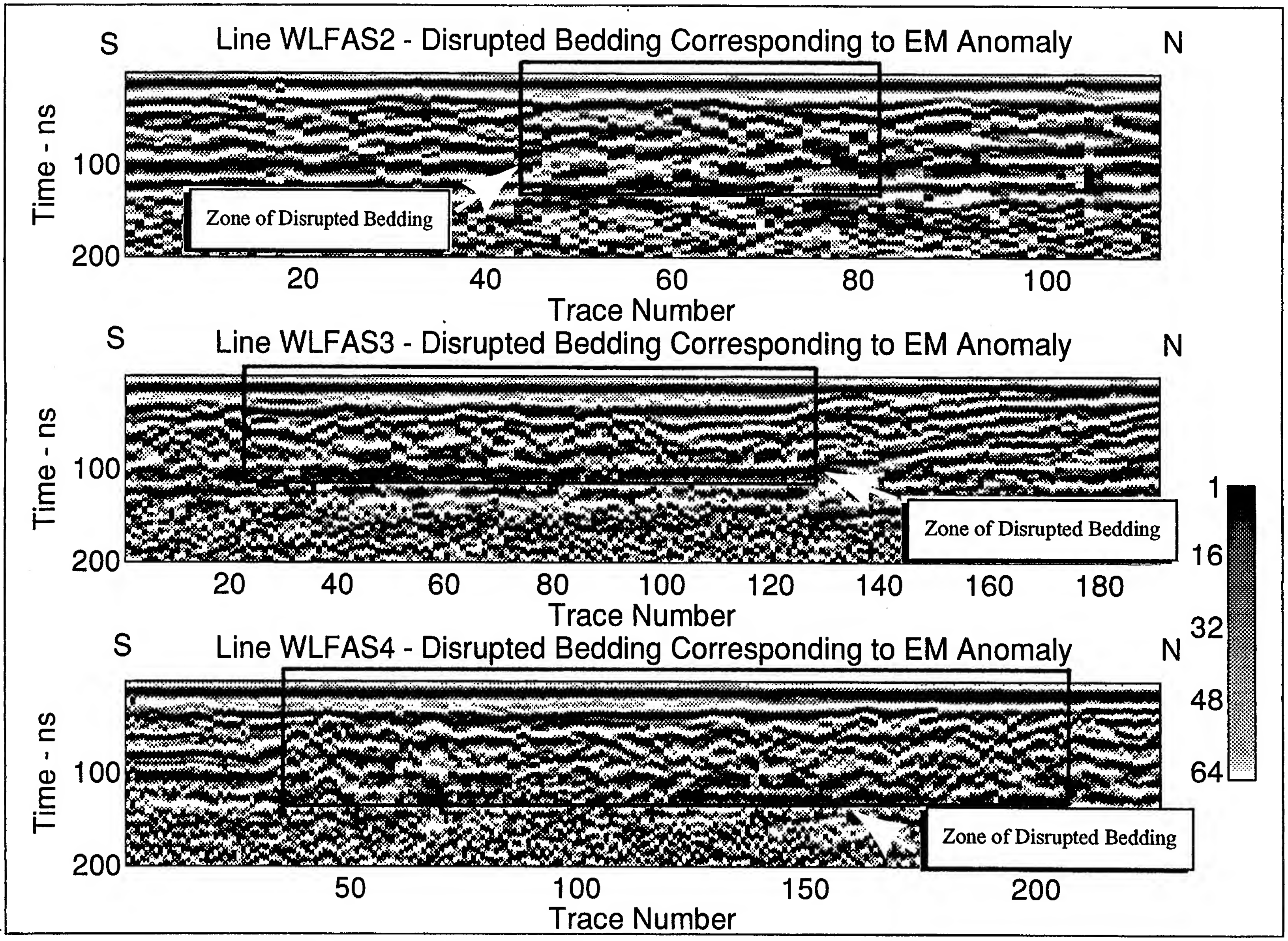


Figure 3-24. GPR Lines WLFAS2, WLFAS3, and WLFAS4 Showing Disrupted Bedding

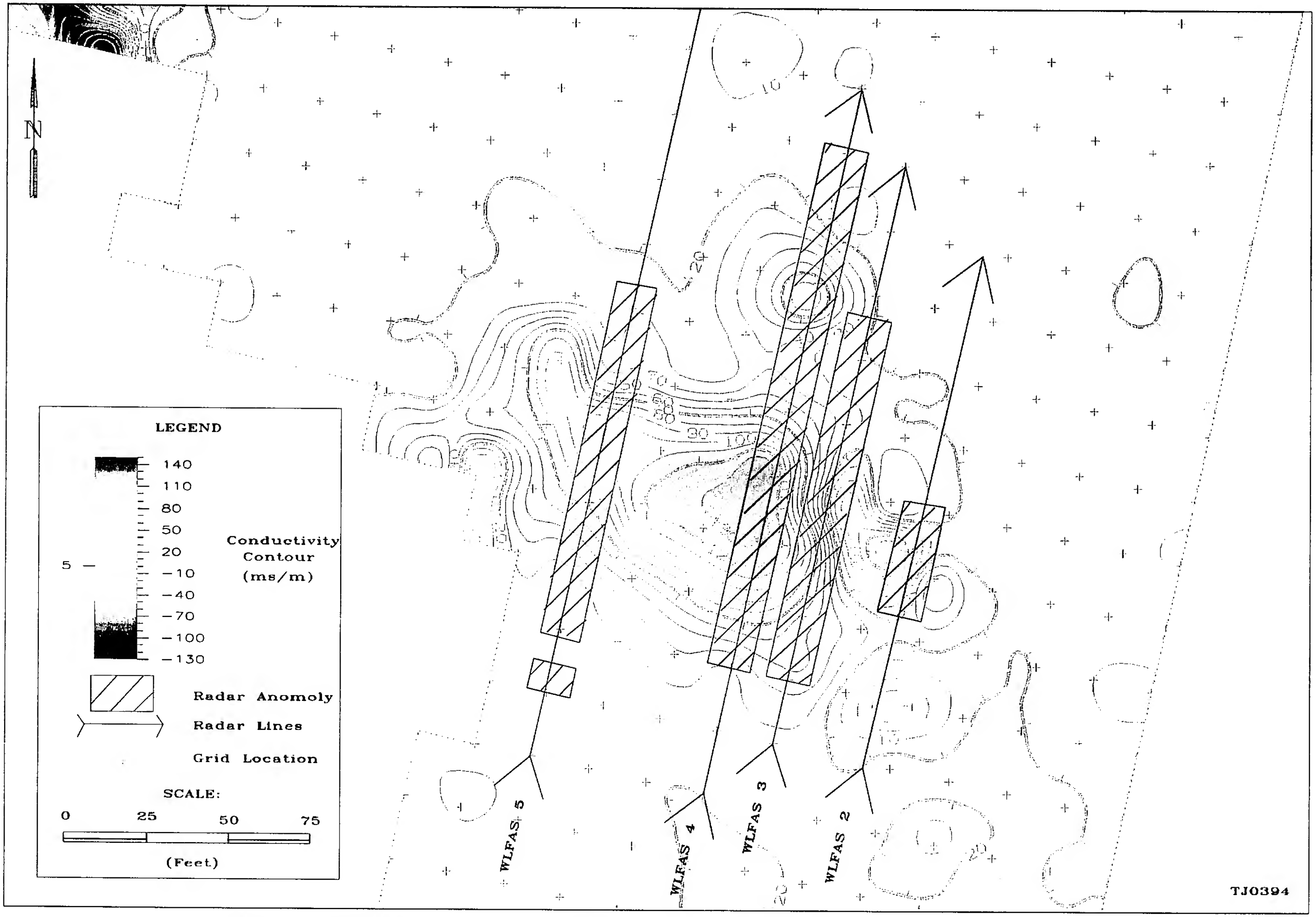


Figure 3-25. Enlarged Area from Figure 3-21 Showing GPR Anomalies

characteristic discontinuous reflectors and hummocky patterns above 100 ns (12 feet bgl)(see outlined areas), indicating disturbed soils or trenches. Reflectors in disturbed bedding generally show a lack of continuity and parabolic shapes resulting from diffractions of the radar wave off of the edge of the event. At the north end of Line WLFAS 3 at approximately 25 ns (6 feet bgl) to trace 140 at 100 ns (12 feet bgl), the reflectors are dipping down to the south. This could indicate the edge of a former trench.

Line WLFAS 5 (Figure 3-26) shows a localized anomaly at trace 30 at 50 ns (6 feet bgl). This anomaly was not detected with the EM and may represent a buried hollow, non-metallic object. Line WLFAS 5 also shows the disrupted bedding from trace 60 to trace 150 at 40 to 90 ns (4 to 10 feet bgl), and is probably indicative of trenches.

Line WLFNW1 runs over the top of the strongest EM anomaly in Area 3. The GPR data (Figure 3-27) indicate one anomalous zone from about trace 60 to trace 90, and strongly distorted reflectors from trace 150 to the end of the line. These distorted reflectors correspond to the areas where the EM data detected the presence of metal.

A strong anomaly is present on line WLFAS 5b at trace 260 and on line WLFNW 2 at trace 60 (Figure 3-28). This point is the approximate intersection of these two lines and corresponds with the EM anomaly in Area 4. The GPR data indicate that the source of this anomaly is just under the surface. Several small anomalies also appear on line WLFNW 2, as indicated by the discontinuous reflectors. These minor anomalies were not detected by the EM survey, and may be natural features in the soil stratigraphy.

The GPR lines collected in area 5 (Figure 3-29) clearly indicate the edges and depth of the pit that create this L-shaped anomaly. Figure 3-30 shows lines WLFNE 1 and WLFNE 4. On line WLFNE 1, a westward sloping reflector can be seen from trace 62, 10 ns (1.5 feet bgl) to trace 80, 80 (9 feet bgl)ns. On line WLFNE4, The same event can be seen sloping from trace 80, 10 ns (1.5 feet bgl), to trace 90, 80 ns (9 feet bgl). This event

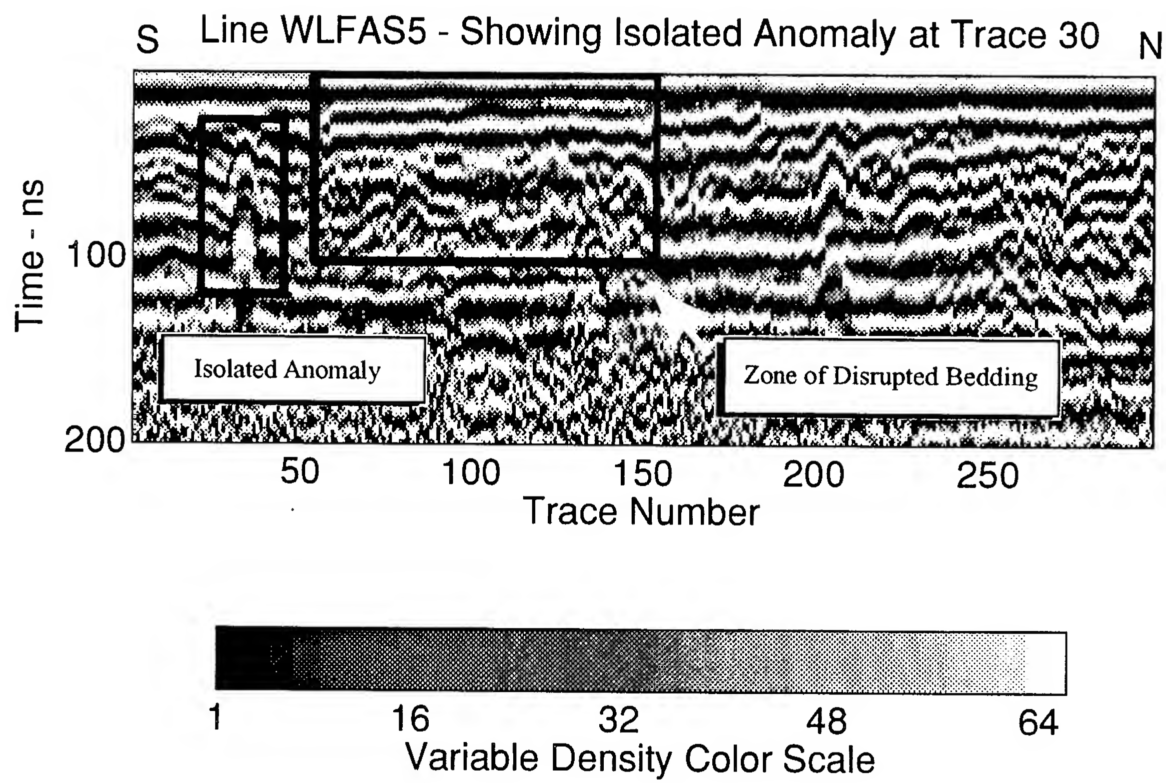


Figure 3-26. GPR Line WLFAS5 Showing Isolated Anomaly and Disrupted Bedding

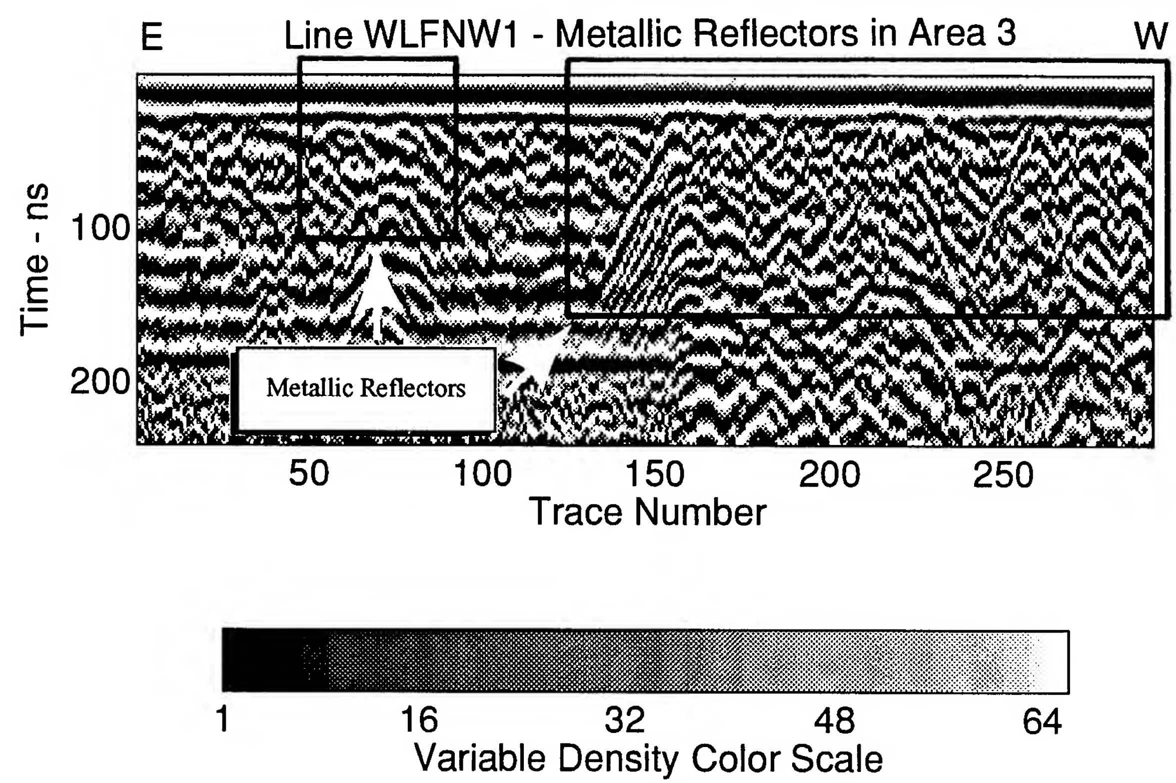


Figure 3-27. GPR Line WLFNW1 Over Anomalous Zone on the EM Data

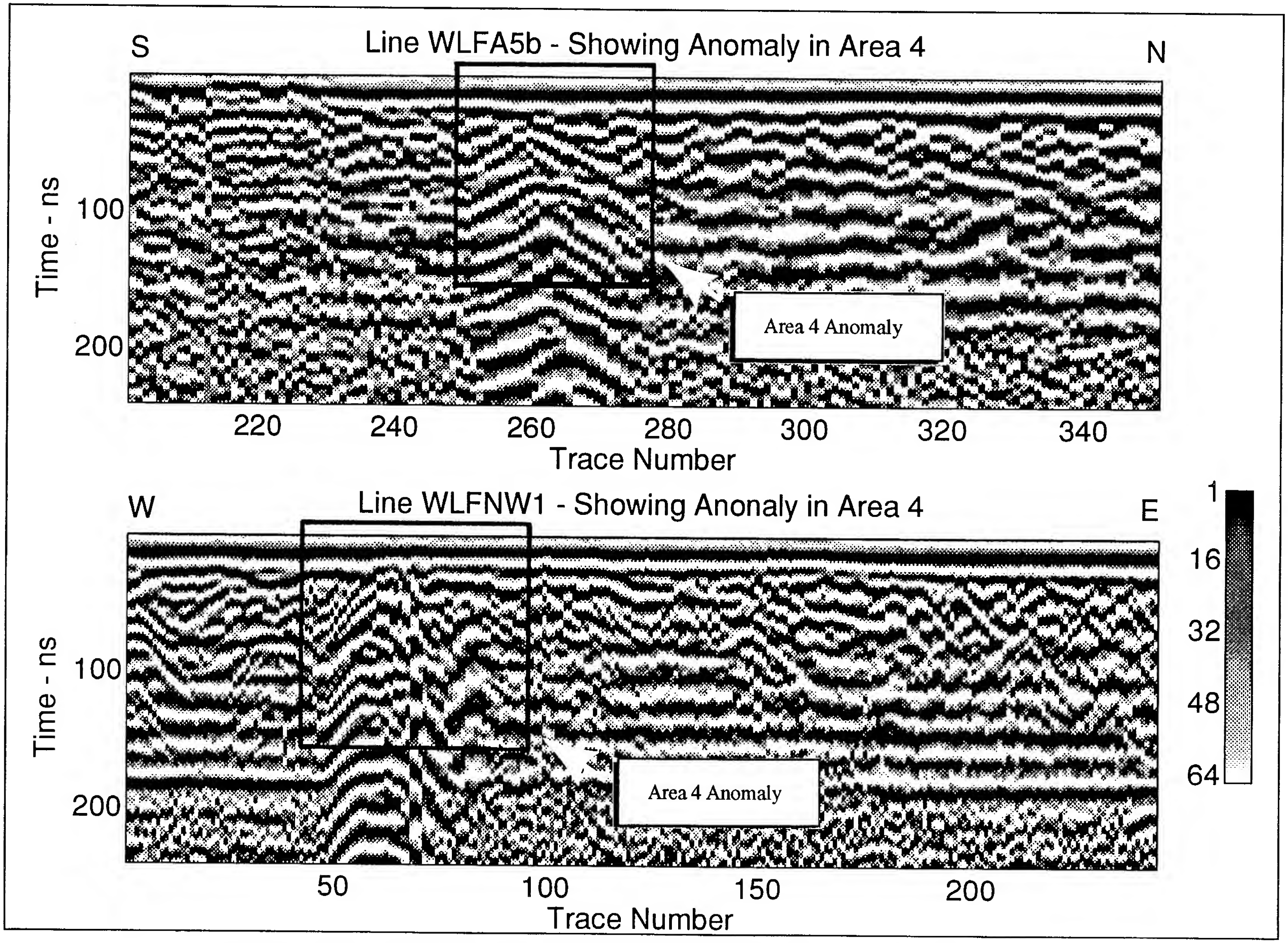


Figure 3-28. GPR Lines WLFAS5b and WLFNW2 Showing EM Anomaly in Area 4

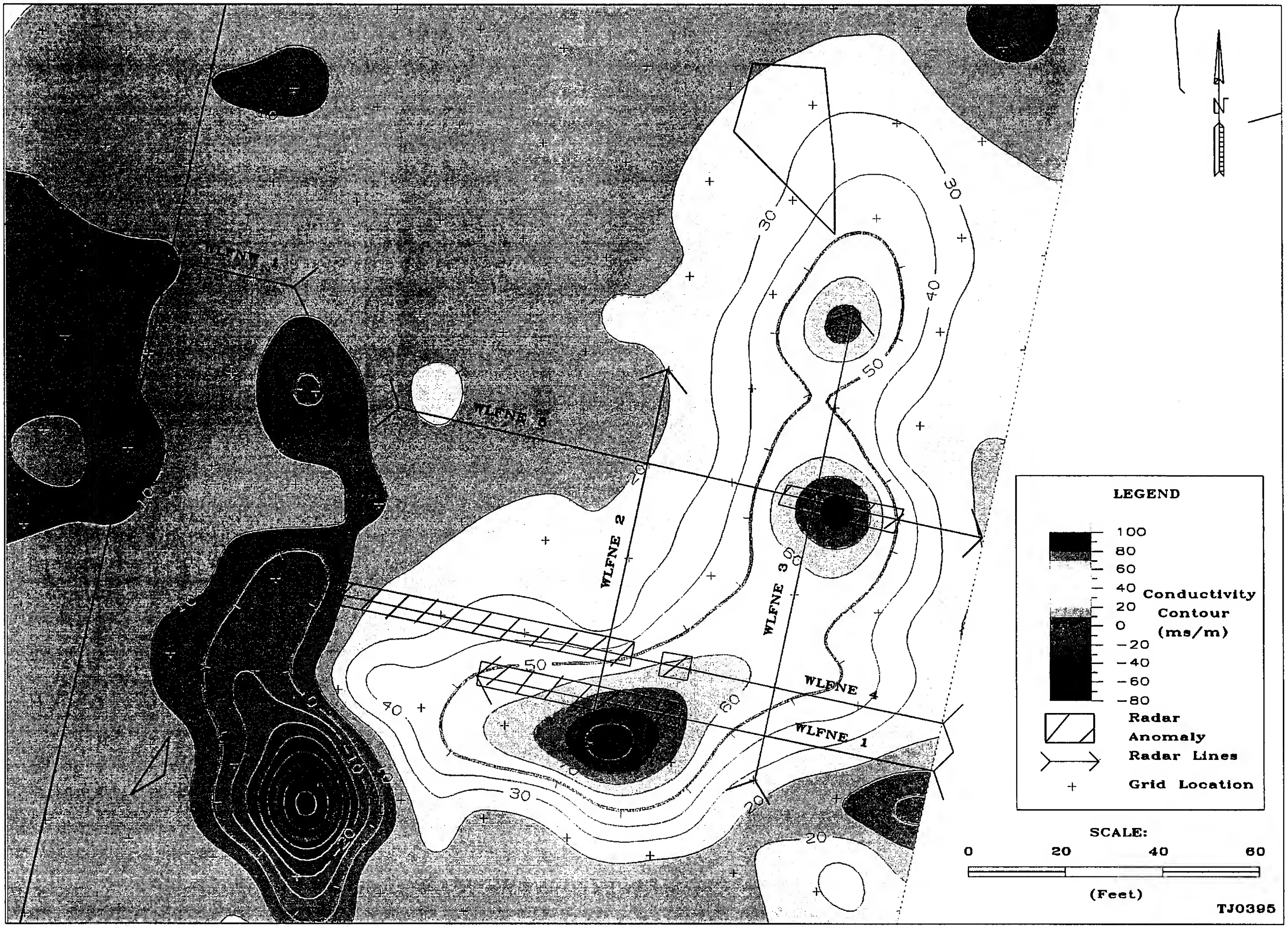


Figure 3-29. Enlarged Area from Figure 3-21 Showing GPR Anomalies

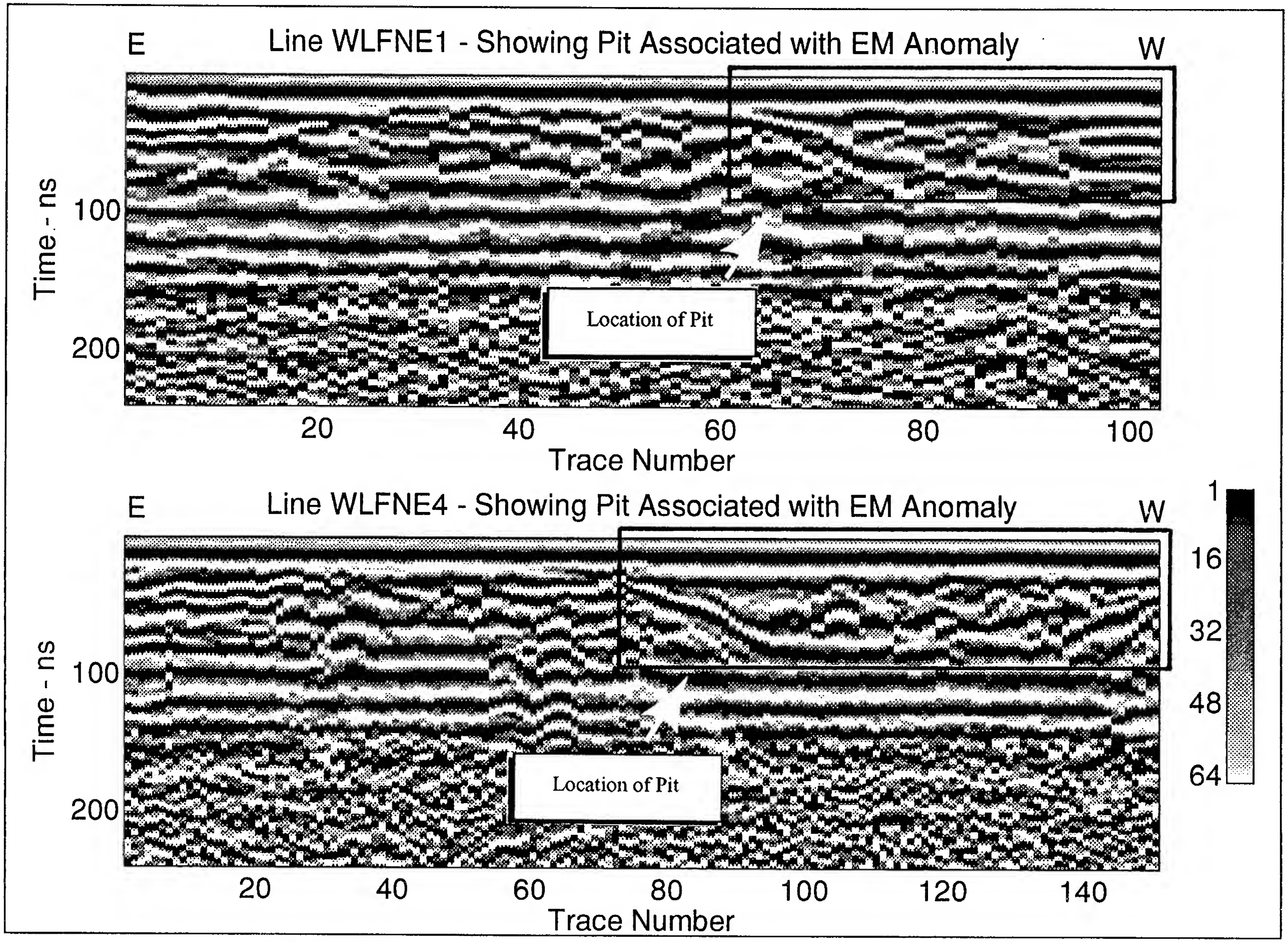


Figure 3-30. GPR Lines WLFNE1 and WLFNE4 Showing Trench

slopes back to the surface at trace 140, 80 ns (9 feet bgl) to the end of the line. The regular shape of this feature suggests that it is not a natural soil feature but is rather, a trench.

In Figure 3-31, Line WLFNE 5, the northern leg of the L-shaped anomaly can clearly be seen. Note the broken reflectors between trace 90 and trace 120 from about 40 to 80 ns (4 feet to 9 feet bgl). This zone corresponds to the anomaly detected by the EM survey. The GPR data here indicate that this part of the trench is on the order of 9 feet deep or less.

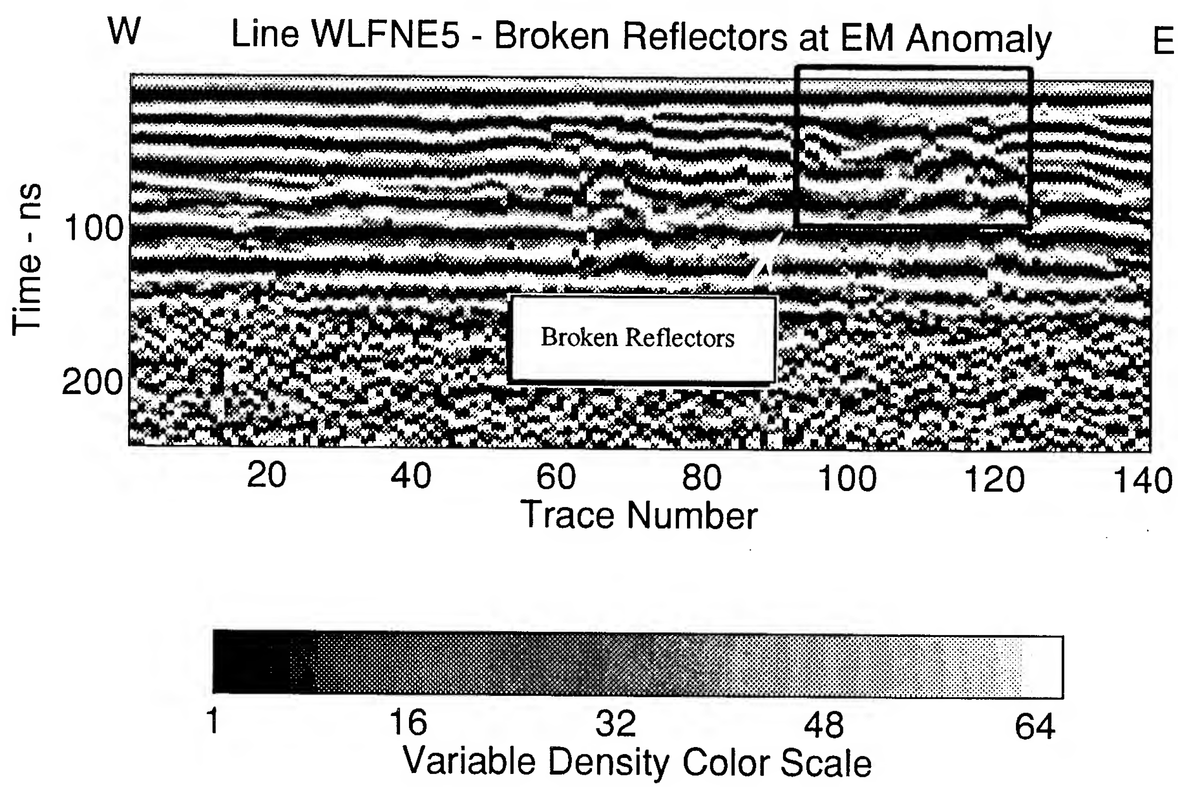


Figure 3-31. GPR Line WLFNE5 Showing Broken Reflectors Which Correspond to the EM Anomaly

4.0 Conclusions

It is apparent from the comparison of the results at the Ambient Site versus the FTA that shallow permafrost is detectable, and that it is not continuous at the FTA as it is at the Ambient site. The GPR data also provided a detailed depiction of the complex stratigraphy at the FTA, and this stratigraphic model may prove to have some bearing on the contaminant transport during high water periods.

The geophysical surveys at the landfill sites indicated that the combination of EM and ground penetrating radar can provide an effective means for determining the lateral extent and depth of areas of waste burial and proved effective for locating soil borings and wells for more detailed investigation. Comparisons of the results of the geophysical surveys and the field screening methods will be addressed in the Galena RI Report.

5.0 Recommendations

Based on the success of the geophysical surveys at the landfill sites, it is recommended that a combination of EM and GPR surveys be carried out at all potential dumping sites at the Galena AFS prior to other field screening methods and the location of projected soil borings and monitoring wells. This data is useful for identifying areas of subsurface metal and disturbed soil and is also useful for defining subsurface stratigraphy. Because of the high conductivity of the groundwater, it is not recommended that GPR be used to detect permafrost which occurs below groundwater. Seismic refraction surveys might be better suited for this purpose.

Soil Gas Investigation Report

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1.0 SCOPE OF INVESTIGATION

Several areas of groundwater contamination resulting from the release of fuels and/or chlorinated solvents have been identified at Galena Airport, Alaska. Soil gas investigations were conducted at these sites by Radian Corporation in the summer of 1993 to locate the downgradient extent of groundwater contamination and to aid in the positioning of proposed monitoring wells. This report presents the graphical results of these surveys in the form of concentration contour maps.

1.1 Site Screening

The accompanying soil gas concentration contour maps illustrate the data collected through field screening activities conducted during the 1993 field season at Galena Airport, AK. Field screening was used as a tool to define the downgradient lateral extent of groundwater contamination at the following previously identified sites:

- FT01: Fire Protection Training Area #1 (FTA);
- ST05: North POL Area;
- ST05: South POL Area;
- ST09: Million Gallon Hill; and
- ST10: JP-4 Fillstands (previously referred to as the Proposed Vehicle Maintenance Building).

In addition to these sites, field screening was performed at the area surrounding Building 1845, the existing Vehicle Maintenance Building. The purpose of the screening in this area was to locate the most probable source of the TCE that was detected in the groundwater collected from monitoring well 06-MW-01.

The soil gas screening task was executed in two phases. During the first phase, grid delineation, the field team established a 100-ft square grid across each site using a Leitz Set 4A EDM Total Station with a Sokkia reflecting prism and prepared site maps.

Grid nodes were assigned number/letter designations (e.g. B-3, A-2, G-5, etc.), and marked with surveyor's flags, hubs, or spray paint. Some of the points however, were moved several feet from proposed grid nodes to allow for easier sampling (by minimizing sampling through concrete and asphalt), to avoid building foundation fill material, and to accommodate utility clearances. The final soil gas contour maps show the exact location of all sampling points.

The second phase of site screening consisted of collecting soil gas data using portable photoionization (PID) and flame ionization (FID) detectors. Soil gas samples were initially collected using an Arts Manufacturing and Supply (AMS) soil vapor probe. However, after several occurrences of equipment failure, the AMS equipment was replaced by a new, more robust Geoprobe System, that could withstand the physical demands required to sample soil gas at Galena Airport. The following list describes the method used to collect soil gas data:

1. The sampling point was located and identified using base maps and field notes from grid delineation.
2. The PID and FID were attached to a section of teflon® tubing, an adapter, and clean drive-tip. A background measurement was recorded to assess the cleanliness of the sampling train prior to sample collection. If measurable organic vapor was detected during the background screening, the tip and adapter were recleaned and attached to new teflon® tubing.
3. The tip was attached to the drive tubes and the soil vapor probe was driven to the desired depth (6 to 8 feet below ground level) using a hand operated, electric, rotary hammer drill.
4. The teflon® tubing and adapter were lowered through the vapor probe drive tubing, and screwed onto the drive tip.
5. Using a jack, the drive tubes were extracted several inches to extend and release the retractable drive tip.

6. The PID and FID were attached directly to the teflon® tubing and the instrument's internal pumps were used to draw the soil gas sample through the PID and FID. The maximum peak detected by each instrument was recorded at each sampling location. If the volume of organic vapors present in the soil gas exceeded the upper limits of the analytical equipment or if the flame in the FID was extinguished due to low oxygen concentrations in the soils, the highest recorded value was logged in the field notebook and flagged with a plus sign (+). This was used to indicate that the recorded value may be biased low. All data from the soil gas analysis (time, depth, background air, background tube/tip, PID reading, FID reading, and comments) were recorded in the field logbook.
7. After collection of the soil gas sample, the tubing was removed and the drive tubes were extracted from the soil using a hand operated jack. Following extraction, the retractable tip and the lead drive tube (if contaminated) was decontaminated.

1.2 Soil Gas Data Analysis

In general, the trends identified from the results of both the PID and FID analysis of the soil vapors were similar. However, the PID results were used to graphically represent the contamination at most sites. FID measurements were less reliable and more sporadic due to frequent flame-outs caused by low oxygen content in the vadose zone. The results of the soil gas surveys were contoured using the Radian contouring software CPS3®. The contours reflect total volatile organic vapors detected by photoionization and were generated using data collected from sampling soil vapor 6 to 8 feet below ground level.

2.0 DATA RESULTS

2.1 FT01: Fire Protection Training Area (FTA)

The soil gas survey at FT01 was performed to determine the downgradient extent of the benzene plume that extended past the southernmost well, 01-MW-01. Soil gas samples were collected at 26 sampling points across the site. Figure 2-1 shows the concentration of organic vapors in soil gas as measured by an FID. As shown in the figure, two areas of hydrocarbon contamination were detected by the FID analysis. The PID instrument did not detect the high level of organic vapor observed in the southern portion of the site. Field notes suggest that the PID may have malfunctioned after exposure to rain water and therefore, this data was not used to generate contours.

The area of contamination in the northern portion of the site corresponds to the soil and groundwater contamination previously identified by soil and groundwater sampling during the 1992 field investigation. The source of the contamination is thought to be the release of fuels within the burn pit during fire protection training exercises. The results of the soil gas survey were used in conjunction with groundwater flow direction calculations to locate a new downgradient monitoring well.

During the soil gas survey a second area of contamination was detected approximately 300 feet south of the burn pit. This area is topographically higher than the burn pit and located hydrologically side/down gradient. The source of the organic contamination is unclear. However, a pipe and valve used for the transfer of fuels was discovered sticking out of the ground when the high grass vegetating the area was mowed in preparation of the soil gas and geophysical surveys. It is possible that during fire protection training exercises, fuel was fed to the burning mock-up within the burn pit via an underground pipe. Spills may have occurred in conjunction with these activities. A monitoring well was installed in the area of observed soil contamination to confirm the

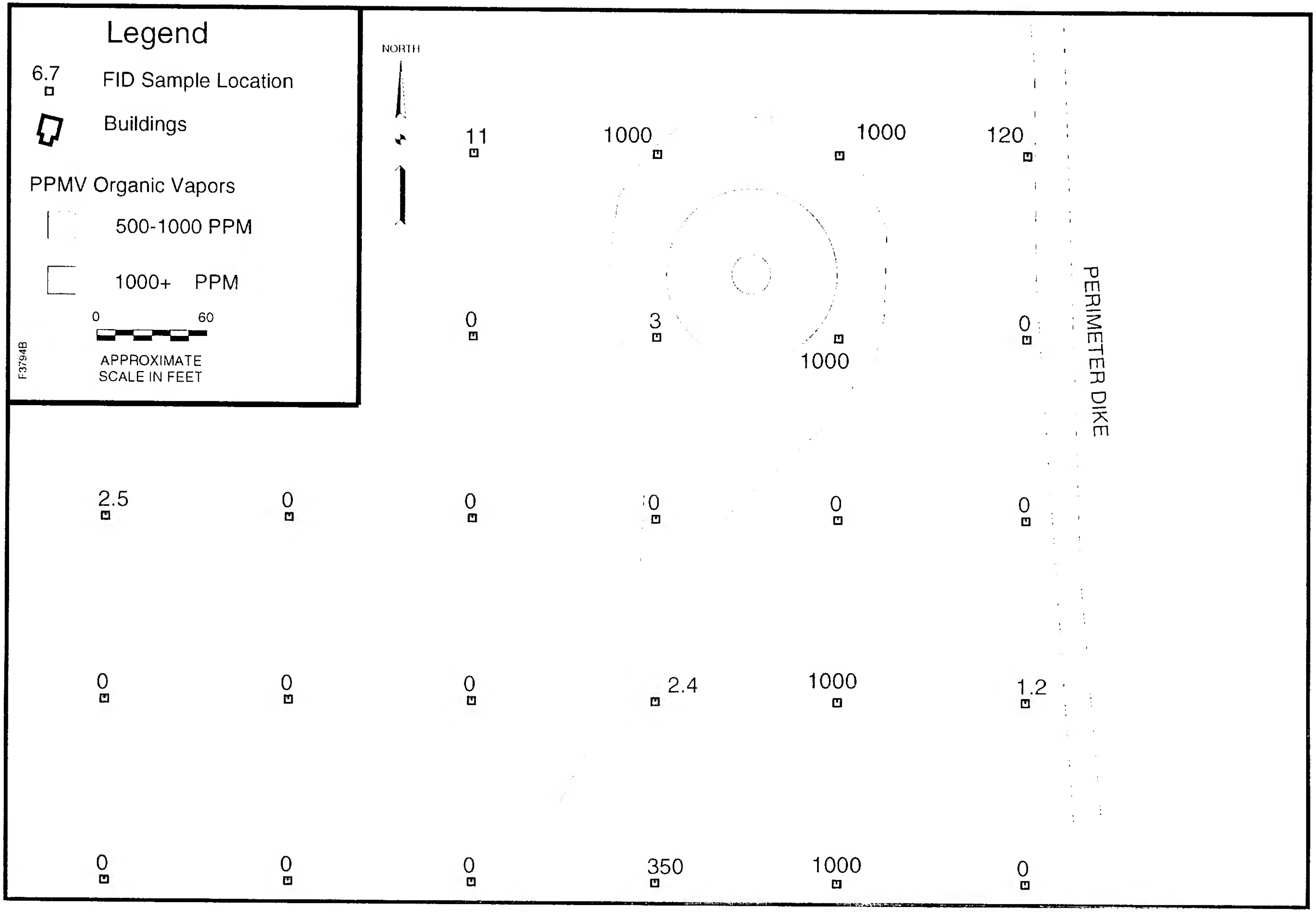

Figure 2-1 Concentration contour map of FID detectable organic vapors in soil gas at the Fire Protection Training Area (FT01), Galena Airport, AK

presence or absence of hydrocarbon contamination in groundwater from this newly identified probable source area.

2.2 ST05: North POL Area

The purpose of site screening at the POL North was to define the downgradient extent of BTEX contamination in the groundwater that was originally identified at monitoring well 05-MW-11 during the Stage 3 Remedial Investigation. A grid was established across a 600' by 500' plot surrounding 05-MW-11. Figure 2-2 illustrates the results of the soil gas survey as measured at 39 sampling points.

The low concentration of organic vapors noted in the southeastern portion of the site is related to the contamination in the southern POL and is discussed in Section 2.3. The central area of contamination that extends from the MOGAS and AVGAS valve rack to the southwest reflects soil and groundwater contamination that originated from spill/releases at the valve rack. This corresponds to the groundwater contamination that was observed in monitoring well 05-MW-11 during the 1992 field season. The southwesterly trend in the contaminant plume, as defined by soil gas analysis, correlates well to the observed groundwater flow direction at the site. Based on the results of the soil gas survey and calculated groundwater flow direction, a downgradient monitoring well was installed southwest of the observed plume.

The two areas of elevated organic vapors detected in the northwest portion of the site may be related. These areas correspond to the former location of abandoned fuel tanks and fillstands that were removed prior to the construction of Building 1872. A soil gas sample collected from the area between the two wings of Building 1872 contained no measurable hydrocarbons. However, the sample could have been collected in clean fill material that replaced potentially contaminated soil after excavation and construction.

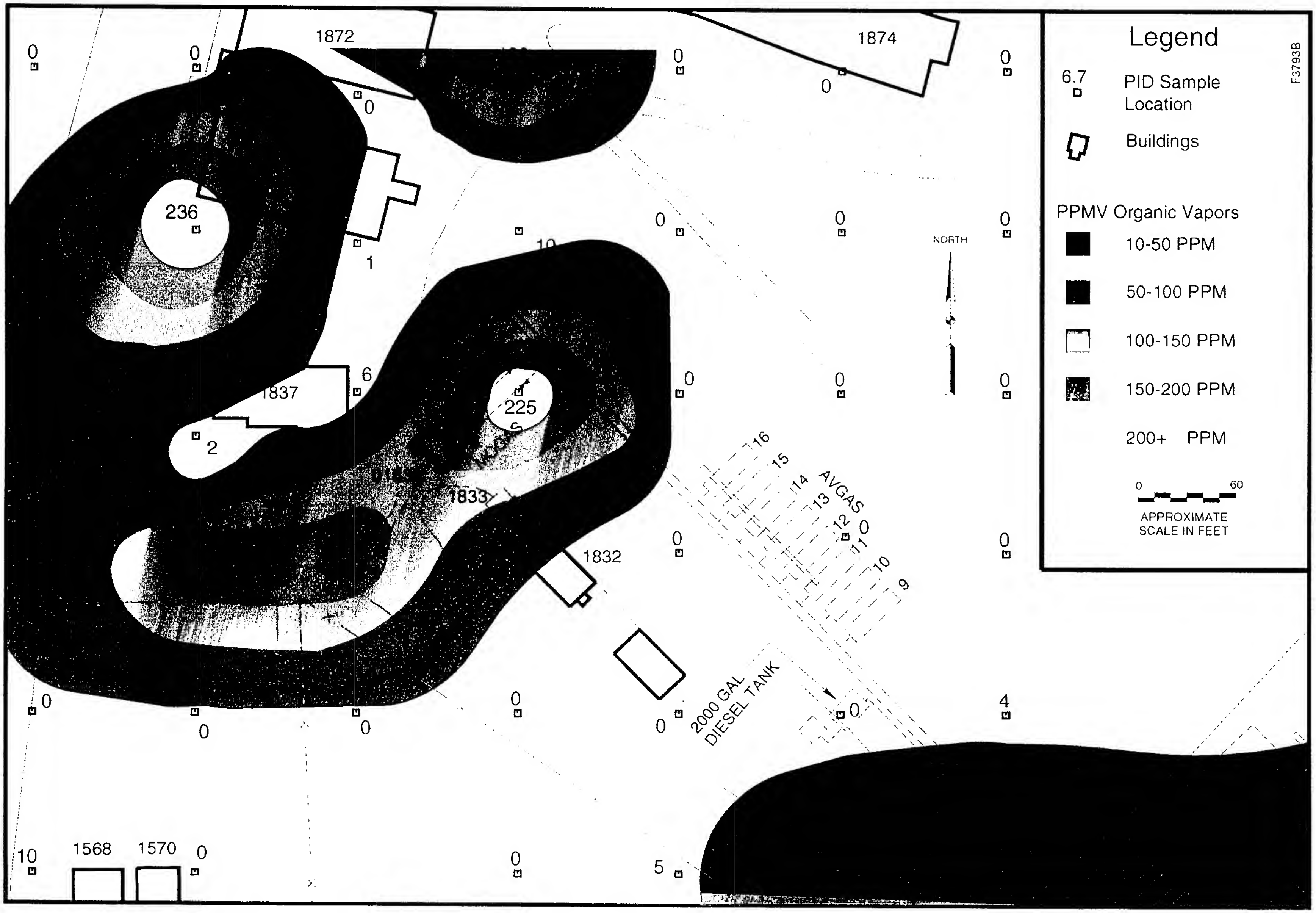

Figure 2-2 Concentration contour map of PID detectable organic vapors in soil gas at the North POL Area (ST05), Galena Airport, AK

Two soil borings were completed and sampled within this area of contamination to confirm and quantify the hydrocarbon content of the soils.

2.3 ST05: South POL Area

Groundwater contamination from the spill/release of fuels in the South POL area was identified by Woodward Clyde Consultants (WCC) and investigated by Radian during the summer of 1992. Free phase floating product (LNAPL) and high levels of dissolved benzene were identified in the downgradient monitoring well at the site. A soil gas survey was conducted across the site to define the downgradient extent of the dissolved hydrocarbon contamination observed in the monitoring wells. Thirty-one soil gas samples were collected and used to create the contour map presented in Figure 2-3.

Three areas of potential contamination can be identified on the soil gas map. They include: 1) the area west of Building 1556, 2) the area north of the Mark Air Building, and 3) the area south of the MOGAS tanks. The source of the organic vapors detected in the area to the west of Building 1556, the Galena Airport Fire Station, is uncertain. A diesel fillstand was located approximately 100 feet west of the sampling point but was removed prior to the installation of the fillstands at site ST10. The low levels of organic compounds detected in the soil gas may be the results of historical spills that occurred at the fillstands.

The isolated area of organic contamination detected north of the Mark Air Services Building is also of uncertain origin. The area occurs in the vicinity of a JP-4 and diesel pipeline that crosses the site. However, there have been no reported releases of fuels from the pipelines in this area.

The large area of hydrocarbon contamination that extends from the POL Tank Farm to the flight service buildings is easily recognized in Figure 2-3. The soil gas results suggest the occurrence of two lobes of contamination indicating multiple source

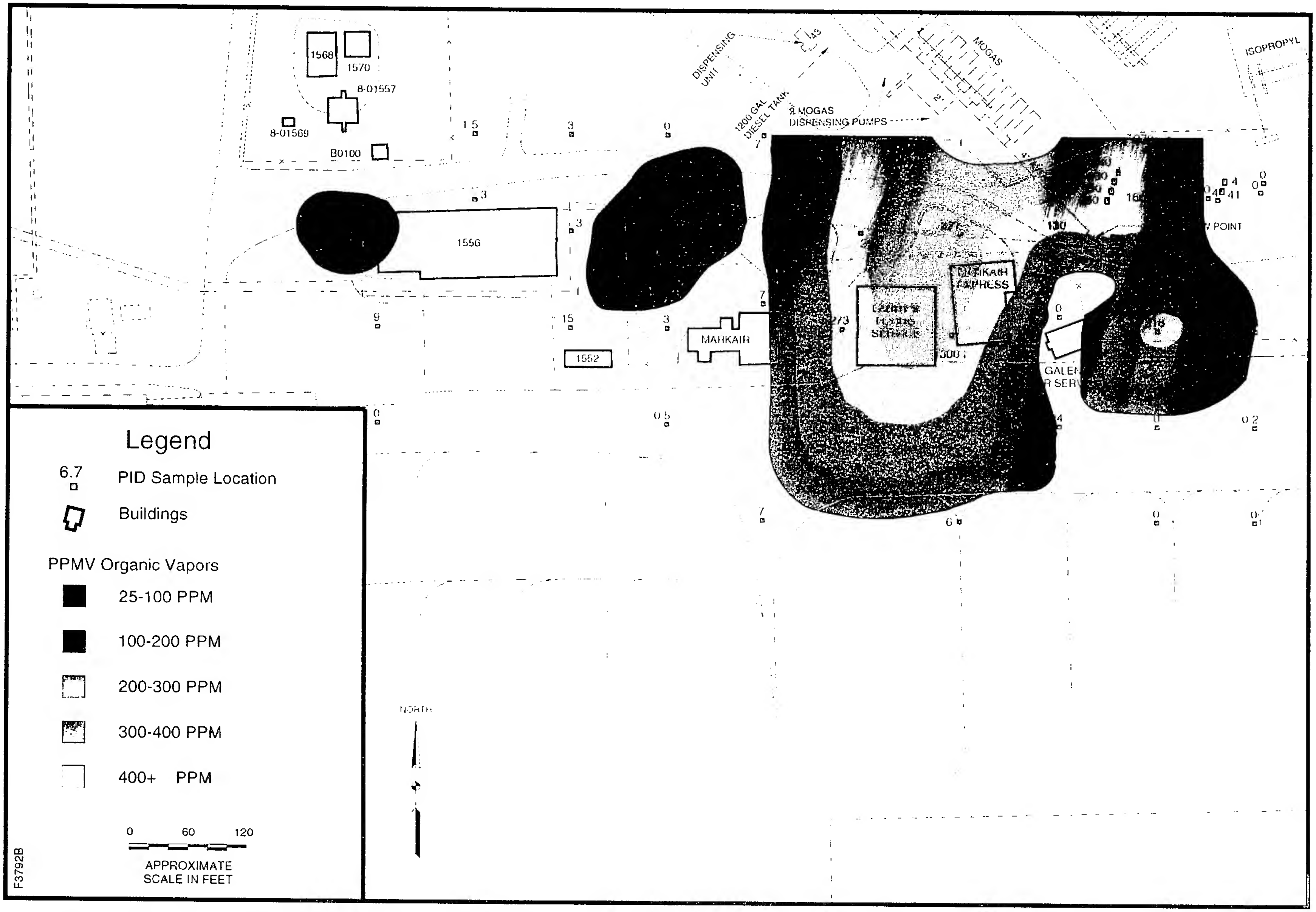

Figure 2-3 Concentration contour map of PID detectable organic vapors in soil gas at the South POL Area (ST05), Galena Airport, AK

areas. The western plume extend below Larry's Flying Service and the Mark Air Express building. The eastern plume occurs in the area east of the Galena Air Service building. Both contaminant plumes exhibit a southerly trend which is consistent with computed groundwater flow directions at the site.

The trends observed in the area of the flight services buildings are similar to the trends defined by the 11th CEOS during their soil gas analysis. Since soil gas samples collected by the 11th CEOS were analyzed for BTEX constituents, the results of their analysis cannot be directly compared to measurements of total organic compounds detectably by photoionization. Therefore, the 11th CEOS data was not included in the soil gas map shown on Figure 2-3. However, the trends defined by both investigations can be compared. The data from the 11th CEOS also indicate the presence of two lobes of contamination that extend in a southerly direction. The two lobes extend below Larry's Flying Service and the area between Mark Air Express and Galena Air Service and combined, cover the same area as the large western plume identified by Radian. This difference in the precise location of the plume is the result of sample placement and sampling density. The information gathered by the 11th CEOS is more tightly clustered around the flight service buildings providing higher resolution and more accurate definition of contaminant extent. The eastern plume that was defined by Radian is not apparent from the 11th CEOS data. No sampling points, however, were installed by the 11th CEOS east of the Galena Air Service building.

Based on the results of the soil gas survey, two monitoring wells were located and installed south of the POL. One well was located in the area south of the main western plume and one was located south of the Galena Air Services building.

2.4 ST09: Million Gallon Hill

Field screening for Million Gallon Hill was conducted to determine the downgradient extent of known hydrocarbon contamination resulting from past spill/releases from UST Nos. 37 and 38. Contamination from petroleum hydrocarbons was detected in soil and groundwater during the 1993 field season, appearing to have originated in the fuel storage facility, with free product detected in 09-MW-08, 09-MW-12, and 06-MW-04. The purpose of defining the downgradient extent was to aid in the placement of monitoring wells outside the contaminant plume.

A grid was established south and east of the fuel storage area, extending south of the CAC hangar. A total of 33 soil gas samples were collected and analyzed using both PID and FID. Many of the proposed sampling locations directly southeast of the large USTs were in deep brush and were inaccessible. Low oxygen levels in the fairly tight soil also prevented the collection of FID data from a majority of the sampling points. Moreover, soil gas samples taken in areas where free product was known to exist contained only slightly elevated hydrocarbon concentrations as detected by the PID. The hydrocarbon contaminant present may be either aging diesel or newer JP-8 which contain very low levels of volatile constituents. This would explain the difficulty experienced detecting soil and groundwater contamination via the soil gas survey.

The data from PID analysis of soil gas was used to generate the western portion of the soil gas map presented in Figure 2-4. In general, the measurable organic vapor from the contamination migrating from Million Gallon Hill was less than 20 ppmv. This was substantially less than the level of contamination observed at other sites. The JP-4 Fillstand Site, for comparison, is shown on the eastern portion of Figure 2-4 and contains up to 283 ppmv organic vapor.

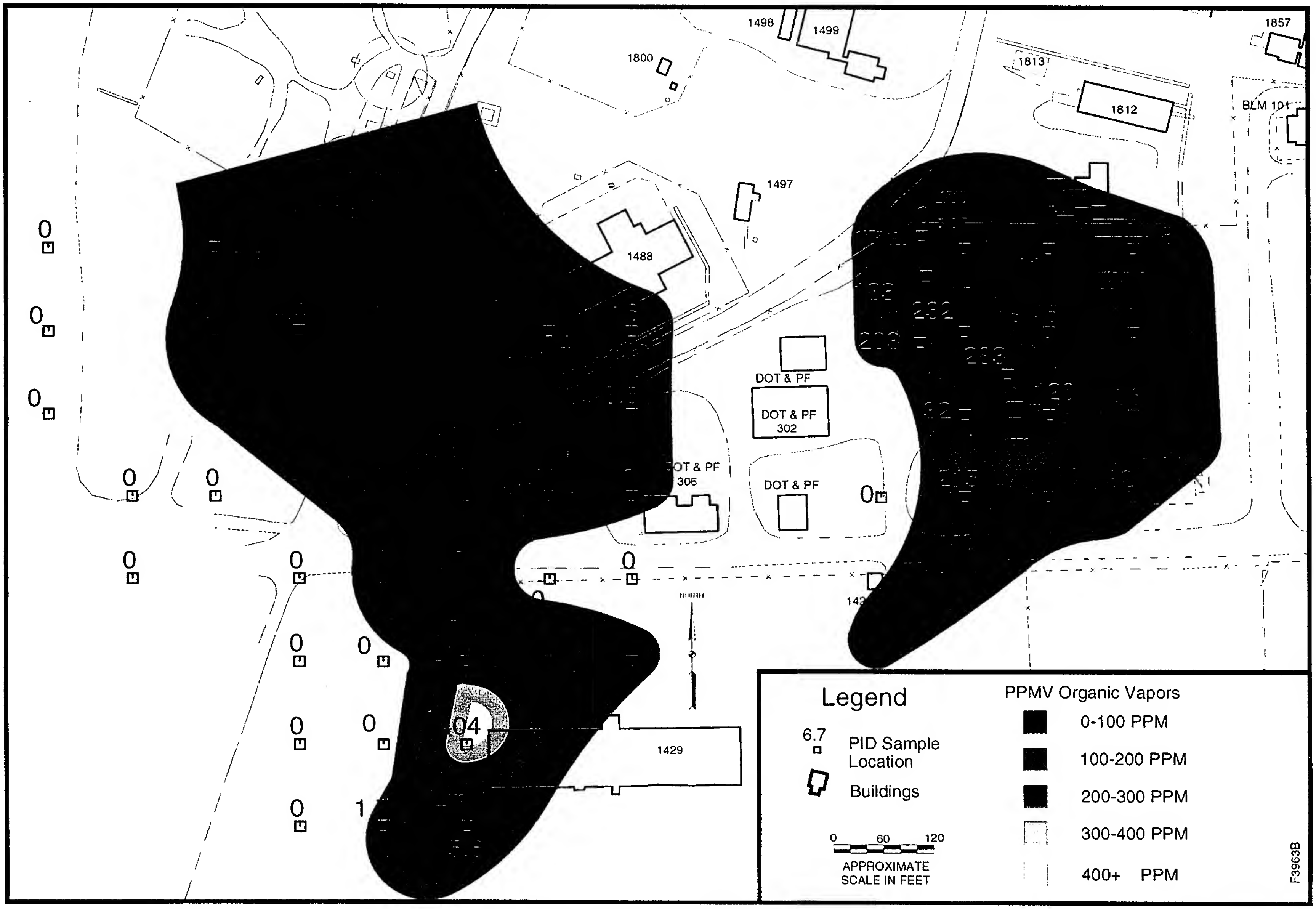

Figure 2-4 Concentration contour map of PID detectable organic vapors in soil gas at Million Gallon Hill (ST09) and the JP-4 Fillstand (ST10), Galena Airport, AK

High levels of organic contamination was detected in a small area west of Building 1429, the CAC hangar. The source contaminant at this site contains significantly more volatile constituents than the hydrocarbons responsible for the contamination originating from Million Gallon Hill. This isolated occurrence of high levels of organic vapor could be a result of surface spills on the tarmac area, historic leaks from the CAC UST located in the general area, or the spill/leak of fuels from bowsers or other mobile fuel storage tanks were stored in this area. A soil boring was completed and sampled in this area. Based on the results of the screening activities, a downgradient monitoring well was installed south of the contaminant plume.

2.5 ST10: JP-4 Fillstands (formerly Proposed Vehicle Maintenance Building)

The investigation around the JP-4 fillstands, or Proposed Vehicle Maintenance Building, was directed to find the source and lateral extent of groundwater contamination which was identified during the 1992 field season. Twenty-one soil gas samples were taken throughout the fillstand area and tarmac. The results from PID analysis of the soil gas samples were used to generate the contoured data on the eastern portion of Figure 2-4.

Based on the soil gas results, two soil borings were placed in the fillstand area to document the lateral and vertical extent of the soil contamination. Also using the results of the soil gas survey and groundwater flow calculations, a monitoring well was placed approximately 100 ft. east of the CAC hangar to document the extent of contaminant migration.

2.6 Building 1845 (Existing Vehicle Maintenance Building) Spill Site

The existing Vehicle Maintenance Building Area was targeted for soil gas screening to identify the source of TCE detected in groundwater collected from

06-MW-01 during the 1992 field investigation. It was believed that Building 1845, the Vehicle Maintenance Building, was the most probable source of the TCE. A total of 23 soil gas were sampled and analyzed with PID and FID. The contours shown in Figure 2-5 illustrate the contaminant plumes identified during the survey.

During the survey, a previously unidentified area of concern was discovered near the southwest corner of Building 1700. This building has been used for the maintenance of the airplane refueling trucks. The elevated hydrocarbon readings may be the result of fuel spills or releases associated with maintenance activities that occurred in Building 1700. Preliminary results from soil samples collected from a soil boring placed near the southwest corner of the building indicate that the soils are contaminated with BTEX constituents, probably originating as fuels, and not from the release of chlorinated solvents. Unfortunately, the analytical equipment used in the soil gas survey, PID and FID, were unable to differentiate between the two plumes consisting of TCE and fuel contamination.

The area of contamination that occurs south of Buildings 1845 and 1342 is the result of TCE contamination. Due to limited low density sampling between these two buildings, it is difficult to pinpoint the exact spill/leak location. However, the results do suggest that the upgradient extent of the plume does not extend north of Building 1847. Based on the results of the soil gas survey, a monitoring well was installed north of Building 1847 to document the upgradient extent of contamination.

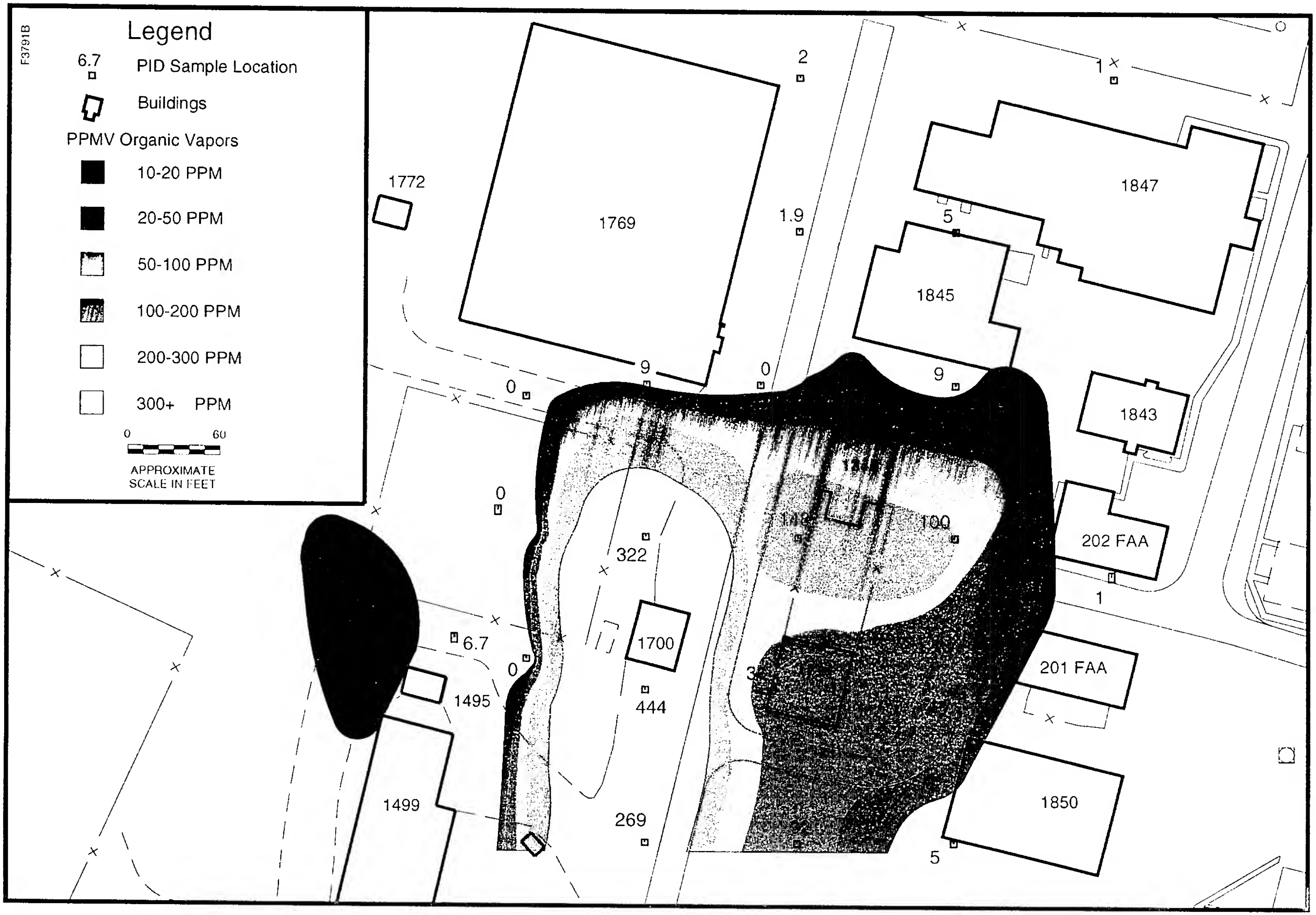

Figure 2-5 Concentration contour map of PID detectable organic vapors in soil gas at Building 1845, Vehicle Maintenance Building, Galena Airport, AK

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